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In Plain English

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How To Create The Perfect PC



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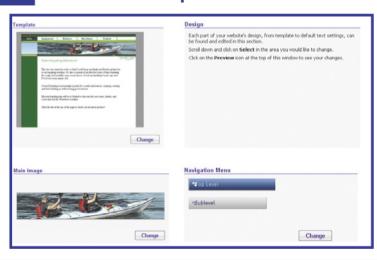


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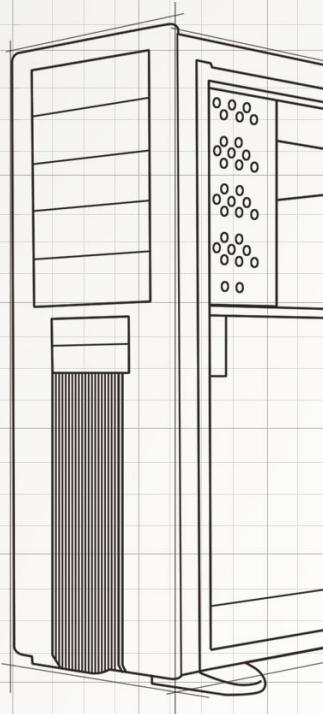
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BUILD YOUR OWN PC



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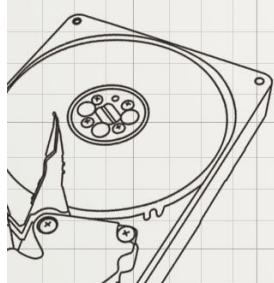
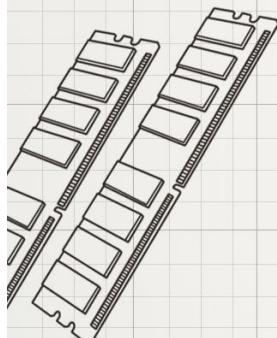
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Canon DC50

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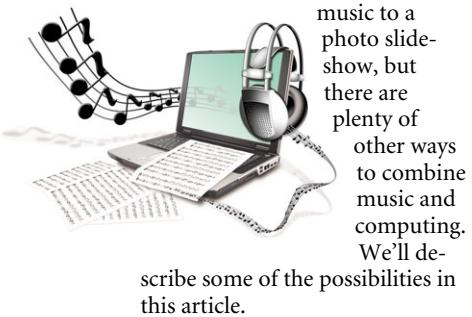
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Live Life On The Edge With Mr. Modem

In which Mr. Modem, author of several books—none of which has won the Pulitzer Prize—and co-host of the weekly "PC Chat" radio show, presents several great hints and tips and even (gasp!) risks bypassing the Recycle Bin.



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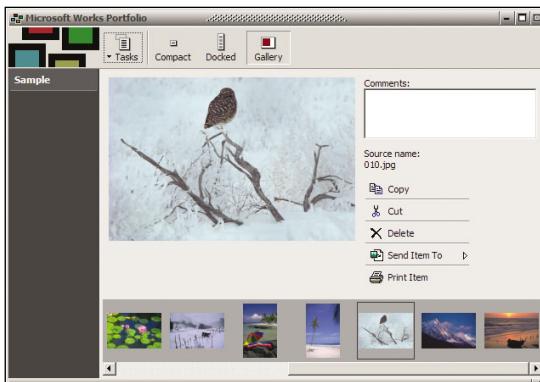
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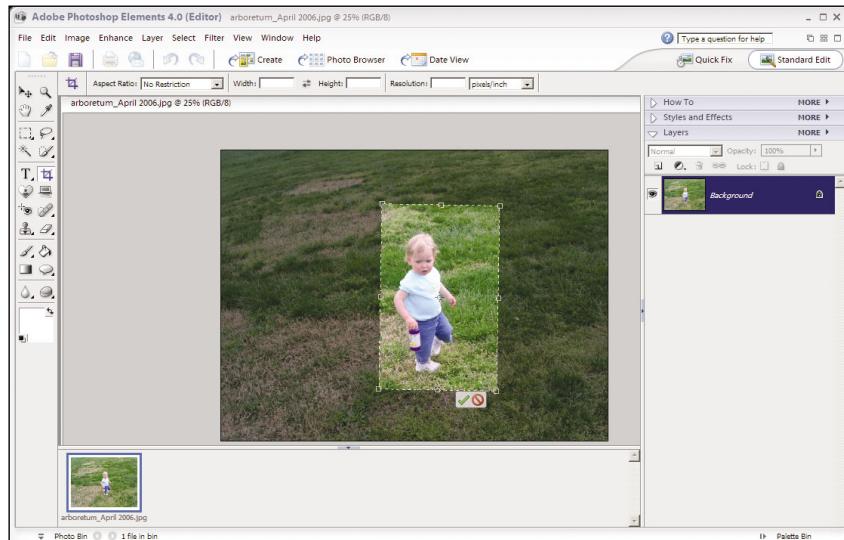
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Editor's Note

We're a species of tinkerers and fixers. We like to build things, repair things, improve things. Think of our forefathers (and our foremothers) heading across the Plains in wagons held together with pegs and baling wire, replacement axles hewn from the nearest deadfall, worn canvas tops stitched and restitched with home-spun twine. Think of shade-tree mechanics cutting gaskets from scraps of cardboard and straightening bent piston rods with a maul and anvil. Think of the countless tile floors, ceiling fans, and replacement faucets installed by generations of handy (or in some cases, not-quite-handy-enough) do-it-yourselfers.

There's just something in our psychology that makes us want to build things or make them work better. That didn't change just because the calendar ticked over to a new millennium, or because we're now in an epoch in which seemingly everything is computerized, laserized, vectorized, and digitized.

And what better modern example of this than the man or woman who builds a computer from scratch? (Well, not really from scratch. As Carl Sagan noted, "In order to make an apple pie from scratch, you must first create the universe.")

But I digress.... Who epitomizes the pioneer spirit more than one who, like Dr. Frankenstein, finds and assembles carefully selected parts and then applies power to make simple pieces of inert equipment live and breathe?

OK, so maybe that's a bit overblown. (And besides, that whole Frankenstein thing didn't really work out all that well, as I recall.)

Still, being able to put together your own computer is quite an accomplishment, yet another step in an ongoing progression of resourcefulness that stretches from our ancestral tinkerers all the way out to... well, us.

Or to some of us, anyway. If the idea of building your own computer sounds a bit daunting, don't be put off. This issue of *Smart Computing* can help. This month, we focus on what parts you need and on how to select and buy them. Then we'll show you, step-by-step, how to put it all together.

You can't go wrong. And you won't need to hew any axles or straighten any piston rods, let alone create any universes.



ROD SCHER, PUBLICATION EDITOR

Now Available On Newsstands . . .

Computer Power User* The Best Board For Your Build

This month, *CPU* rounds up a slew of motherboards and puts them to a set of rigorous tests so you can decide what you most need and want in a foundation for your next PC. You can also catch up on current and future motherboard and chipset features to help you make the best component and peripheral choices, and don't forget to check in on your favorite columnists and reviewers, as well.



PC Today* Don't Lag Behind

If your mobile devices and accessories are starting to show their age, check out this month's issue of *PC Today*. Inside you'll find a look at what's new in GPS gear, portable storage, device cases, iPod accessories, headsets, hands-free kits, and notebook cards.



First Glimpse* Audio For Your Home Theater

Your HDTV brings the stunning visuals of a movie theater to your home, and a top-tier audio system lets you experience the seat-rumbling shock of a rampaging T-rex and the swashbuckling exploits of Jack Sparrow and Will Turner. We have ideas, whether you want to piece together high-end components or quickly set up an HTB (home theater in a box).



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DESKTOPS & LAPTOPS

USB Hops Aboard The Wireless Train

The PC is quietly heading toward a major step in its evolution—and no, we're not talking about Linux (this time). Instead, we're talking about a step destined to significantly alter the way you use your PC at home.

The Certified Wireless USB specification has been under development since 2004, and now Wireless USB is ready for prime time. This standard works within the same basic principles of USB 2.0, which allows easy, plug-and-play connection of various devices to a PC, but it adds the massive convenience and power of wireless technology. Just as most connected devices, such as MP3 players, external hard drives, mice, keyboards, printers, and flash drives, use USB for their connections, the same types of devices will eventually use Wireless USB.

The Wireless USB 1.0 specification provides data rates of up to 480Mbps (megabits per second) within a radius of 3 meters, but the speed drops to 110Mbps within 10 meters. For most home users, that provides plenty of room to continue using their USB-equipped devices as they do when the devices are wired. Furthermore, within that 3-meter radius, users will enjoy the same speed as they do with current devices that use the USB 2.0 specification. Considering that many users have multiple USB devices connected to their PCs, this specification will help to eliminate the bulk of wires draped

behind (and over, across, and under) desks.

Built-in protocols and authentication procedures, combined with the fact that Certified Wireless USB products are required to encrypt data transmission, ensure that switching to Wireless USB devices won't introduce security risks. Also, applications designed to work with traditional USB should work without a hitch with Wireless USB.

The possibilities of Wireless USB technology are intriguing. For example, manufacturers have already shown how digital cameras will be able to communicate wirelessly with PCs, instantly downloading pictures to a PC's hard drive. And because the technology will be integrated with set-top boxes, PVRs (personal video recorders), DVD players, and other home entertainment components, consumers should



Products such as D-Link's DUB-1210 wireless USB adapter have passed testing for Certified Wireless USB, the new USB standard.

be able to anticipate the near-elimination of the mind-boggling rat's nest of wires littering the space behind their home entertainment consoles.

According to the USB Implementers Forum, six consumer products have already passed compliance and certification testing for Certified Wireless USB. These include Dell's Inspiron 1720 notebook, D-Link's DUB-1210 wireless USB adaptor and DUB-2240 4-port wireless USB hub, Iogear's Wireless USB Hub and Adapter Kit, and Lenovo's ThinkPad T61/T61p 15.4-inch wide-screen notebook.

"It is a great endorsement to have consumer-recognized PC and CE companies be the first to incorporate Certified Wireless USB into new products," said Jeff Ravencraft, USB-IF president. "This makes a huge statement that Certified Wireless USB is here." ▀

STORAGE

New Eco-Friendly Hard Drives Ramp Down Power

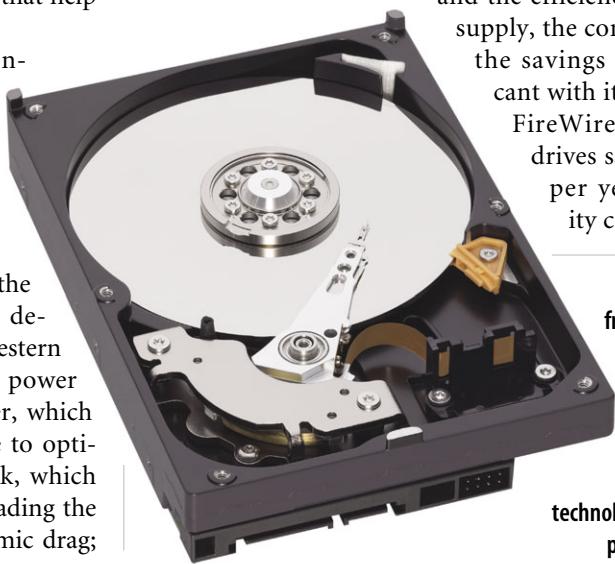
As utility costs continue to rise, many consumers are seeking innovative ways to cut energy costs. Manufacturers such as Western Digital are becoming increasingly aligned with these efforts, releasing products that help to conserve energy.

Western Digital has announced a new environmentally friendly line of desktop, enterprise, CE, and external hard drive products that can save up to 40% in hard drive power consumption, or up to \$10 per drive each year. Called GreenPower, the drives are shipping in capacities ranging from 320GB up to 1TB (terabyte).

The drives take advantage of Energy Star 4.0, the newest iteration of the widespread certification designed to reduce energy consumption. Several Western Digital technologies are used to help reduce the power consumption in the drives, including IntelliPower, which balances spin speed, transfer rate, and cache size to optimize power savings and performance; IntelliPark, which lowers power consumption by automatically unloading the drive heads during idle times to reduce aerodynamic drag;

and IntelliSeek, which calculates optimum speeds to lower power consumption, noise, and vibration.

Depending on the number of hours that the drive is on and the efficiency of the power supply, the company says that the savings can be significant with its external USB, FireWire, and Ethernet drives saving up to \$14 per year in electricity costs. ■



This Caviar GP drive from Western Digital is a member of the company's new GreenPower family, which features multiple technologies that decrease power consumption.

DISPLAYS

DisplayPort Samples Continue To Surface

DisplayPort, the next-generation display interface standard expected to compete with HDMI (High-Definition Multimedia Interface), received a major boost from well-known manufacturers when they announced that products are either available now or will be emerging very soon.

Samsung announced it has developed what it claims is the world's first LCD panel using DisplayPort, a 30-inch panel that boasts 2,560- x 1,600-pixel resolution. The company said that the high data rate of DisplayPort allows the new LCD to use only one interface, instead of two DVI (Digital Visual Interface) ports.

Genesis Microchip worked with Samsung to create the panel using a new four-lane, 2.7Gbps (giga-bits per second)-per-lane interface chip that delivers the high resolution at up to 10 bits of color depth or 1.07 billion colors, which would require at least three DVI or four LVDS

(Low-Voltage Differential Signaling) interface chips in other panels, according to the company.

AMD, which acquired graphics card manufacturer ATI last year, announced that it will release R700 FireGL graphics cards next year that include DisplayPort outputs. In August, AMD demonstrated the first graphics processor that uses the interface. Earlier this year, we reported that Dell already unveiled a prototype LCD using DisplayPort, and the company expects to release displays featuring the interface this year.

Although some critics complain that the industry doesn't need yet another display standard, other observers theorize that DisplayPort's lack of licensing fees—a trait that HDMI doesn't share—will lead to cheaper products. Further, the standard is geared specifically for monitors, whereas HDMI is focused on consumer electronics. ■



Printing: Hazardous To Your Health?

Think you're safe from pollution inside your home office? Perhaps not, according to a study that appeared in the American Chemical Society's Environmental Science & Technology journal.

Researchers in Australia began searching for the source of high particulate matter that appeared during the workday inside a non-smoking office. They traced the levels—which were five times higher than outdoors near a freeway—to printers. In fact, tests conducted on 62 printers within the building revealed that people standing near printers could suffer potential health problems, with one printer giving off toxin levels similar to those emitted by a cigarette smoker.

Lidia Morawska of the Queensland University of Technology in Brisbane, Australia, worked with

colleagues to run tests on Canon, HP, Ricoh, and Toshiba printers sold both in Australia and the United States. The team tracked particle emissions from printers during different stages of use, such as those using new toner cartridges and those using cartridges that were nearly empty.

The team didn't discover the pollution by specifically searching for it. "We came across it by chance," Morawska told the American Chemical Society news service. "Initially we were studying the efficiency of ventilation systems to protect office settings from outdoor air pollutants."

While 17 of the tested printers were tagged as "high particle emitters," 37 released no particles that diminished air quality, six released low particle levels, and two released medium particle levels. |

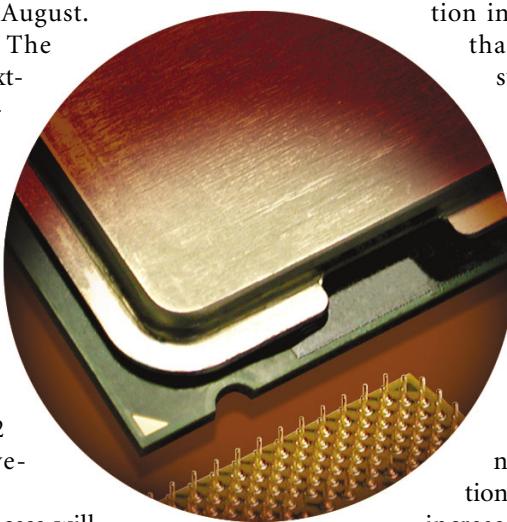


Penryn Sparks Intel's 45nm Arrival

At press time, AMD's Barcelona processors were expected to hit the market in August. But, Intel is hot on AMD's heels. The company is gearing up for its own next-generation processor unveiling, marking the chip giant's first retail foray into 45nm processor architecture. The Penryn family is set to be released in the fourth quarter of this year, earlier than anticipated.

The current 65nm fabrication has supplied computer users with impressive advances in both performance and power-saving features, but Intel's upcoming Core 2 chips promise even more improvements in these areas.

According to Intel, the 45nm process will result in twice the transistor density, in turn leading



to smaller chip sizes; approximately a 30% reduction in transistor-switching power; greater than 20% improvement in transistor-switching speed; and greater than 10 times reduction in transistor gate oxide leakage, which will provide for lower power requirements and increased battery life.

The Penryn chip family adds enhancements to Intel's Wide Dynamic Execution, Advanced Smart Cache, Advanced Digital Media Boost, and Intelligent Power Capability technologies. In particular, Advanced Digital Media Boost now welcomes a new Intel SSE4 instruction set, with dozens of new instructions to increase the performance of video accelerators, graphics building blocks, and streaming load. |

Store It Online Forever

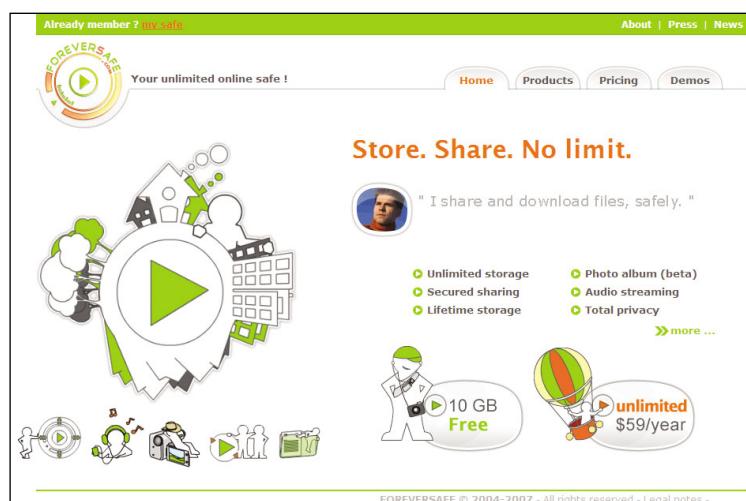
If you're in the responsible habit of backing up your important data on a regular basis, you've likely investigated online backup services, which charge a nominal fee for online storage. These services prove not only convenient but also reliable, because you don't have to worry about your local hardware failing and subsequently losing your data.

However, an online backup service based in France, called Foreversafe (www.foreversafe.com), not only stores your data but also promises to keep your data even after your subscription ends. For \$59 a year, users can enjoy unlimited storage and unlimited file sharing with other Foreversafe customers, with no upload or download restrictions other than file size (which is currently limited to 2GB).

File sharing is protected using a duplication system that allows the transfer of files from one user's "safe" to others. A copy ticket is issued to the person requesting the transfer of files, and this ticket can be sent to contacts using the Foreversafe Web site or using email or instant messaging. The contacts can then decide whether or not to accept the invitation to share files.

A free service is also available that offers 10GB of storage with up to 150MB per month of file transfer. Be aware that

although the company promises lifetime storage of files, there's no guarantee your files will stick around if Foreversafe goes out of business. ▀



If you're looking for long-term online storage, consider Foreversafe, which promises to keep your data forever, even if you stop paying for the service.

PROBLEM-SOLVER: TROUBLESHOOTING THE NEWS

I reformatted my computer and now Windows doesn't see the partitions on one of my extra hard drives.

If you suspect the drive's partition table is damaged, download the RIPLinux ISO from www.tux.org/pub/people/kent-robotti/looplinux/rip, burn it to a CD, and boot directly to it. Log in as root, type **testdisk**, press ENTER, and follow the instructions for analyzing the drive. When the Write option becomes available, use it.

My LCD monitor has no signal after I turn it on.

If you're using an ATI graphics card and are using Windows' power

management features to automatically turn off the monitor after a specified amount of time, outdated drivers might be preventing the monitor from returning to a powered-on state. Download and install the most recent ATI drivers for your card.

Why does Windows Vista continually try to install my keyboard?

If Windows Vista or Windows XP doesn't remember that it already installed your mouse or keyboard from session to session, and if you're using a USB device, try unplugging and reinserting the device while logged into Windows. This can temporarily solve the problem if you're unable to

use the device. If that works, use the Device Manager to manually install drivers from the product CD or that you downloaded from the manufacturer's Web site.

My PC turns itself back on after I turn it off.

Although this can signal a failing motherboard or power supply unit, you might be able to solve the problem by moving a jumper on your motherboard. Check your motherboard's manual to find the Clear CMOS (complementary metal-oxide semiconductor) jumper. If the jumper is set to Clear, follow the manual's instructions for disabling the jumper. ▀

New BlackBerry Goes Dual-Mode

Apple's iPhone might continue to steal most of the smartphone-related headlines, but other major industry players aren't giving up the ghost just yet. In fact, some, such as RIM (Research In Motion), are steamrolling ahead.

RIM recently pulled the wraps off its BlackBerry 8820 smartphone, which now serves as RIM's thinnest smartphone model. This handset not only includes all of the standard features to be expected in a BlackBerry device, but it also integrates dual-mode technology, with EDGE (Enhanced Date for GSM Evolution), GPRS (General Packet Radio Service), GSM (Global System for Mobile Communications) cellular, and Wi-Fi connectivity included.

The 8820, which features support for 802.11a/b/g standards, works with both BlackBerry Enterprise Server and BlackBerry Internet Service. Like other dual-mode devices, the 8820 can switch seamlessly between cellular networks and Wi-Fi networks and includes advanced wireless security protocols such as WEP (Wireless Equivalency Protocol), WPA (Wi-Fi Protected Access), and WPA2. Also featured are Cisco Compatible Extensions for secure connectivity with Cisco wireless solutions and IPSec (Internet Protocol Security)-based software for connectivity with VPN (virtual private network) gateways from vendors such as Cisco and Check Point.

The 8820 supports UMA (Unlicensed Mobile Access), enabling wireless carriers to offer fixed mobile convergence services, which allows business and home users to enjoy seamless switching of voice calls between a wireless carrier's cellular network and a Wi-Fi network.

In addition to its connectivity options, the BlackBerry 8820 also includes a built-in GPS (global positioning system) that provides out-of-the-box support for location-based applications and services, including BlackBerry Maps. Application support, in particular, could be a big selling point for the device, as the 8820 can support third-party software for uses such as CRM (customer relationship management), sales force automation, field services, business intelligence, and others.

Despite the heavy business focus, the new BlackBerry includes a wealth of consumer-driven technologies, as well. It supports the new Bluetooth stereo audio profile and comes with several enhancements to the BlackBerry media player. For example, users can play music and search for songs by entering the title, genre, artist, or album name, and videos can be played in full-screen mode. Also included is the Roxio Media Manager for BlackBerry, which helps users create playlists; view and organize



Research In Motion recently unveiled the BlackBerry 8820, which integrates dual-mode technology with EDGE/GPRS/GSM cellular and Wi-Fi connectivity included.

media files; and automatically copy or convert pictures, music, and videos for optimal playback on the 8820, according to RIM.

AT&T will be carrying the BlackBerry 8820, but pricing was not available at press time. For more information about the device, visit www.blackberry8820.com. ▀

DULY QUOTED

“She’s a brand new Internet user. She didn’t even have a computer before.”

—Peter Lothberg describes his 75-year-old mother, Sigbritt, who received what is believed to be the fastest residential Internet connection in the world, at 40Gbps (gigabits per second). Lothberg worked with the head of the Karlstad, Sweden, network unit to install the connection as a demonstration for a new modulation technique.

Source: Associated Press

News From The Help Desk

Our Most Common Tech Calls

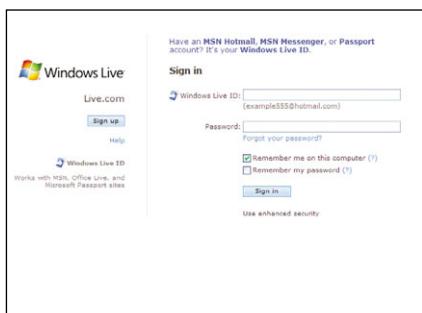
COMPILED BY KYLEE DICKEY

Each month, we receive numerous technical support calls and email messages. Some computer problems are fairly common, and we find that many callers struggle to resolve the same issues. In this article, we cover five of the most common or timely tech support questions and provide our solution for each of them.

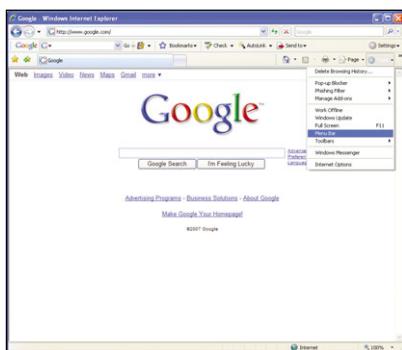
Q I bought an iPhone, but now I see an Exception Error message on the screen each time that I try to sync my iPhone with my Windows computer. Why is this happening, and how can I make the error message go away?

A Apple has discovered a problem in which you may see the Exception Error message if there is an invalid email address in one of your address books. The invalid address could be on your iPhone itself or in a Yahoo! Address Book. Less frequently, the error may occur when the invalid email address is saved in one of your other address books on your computer.

Apple suggests that you begin troubleshooting by going through each of your address books on both your iPhone and your computer. Double-check each of the contacts in your address books and make sure that the email addresses are properly formatted (in the form `username@domainname`) and that you didn't mistype any of the contact information.



You can use Windows Live's Forgot Your Password? link to reset a forgotten password.



Click the Tools button and Menu Bar to make the Menu bar appear in IE7. It is turned off by default.

If you find any email addresses that are not typed correctly, either make the necessary corrections or delete the contact's entry from your address book. Once you take these steps, your iPhone should sync properly, and you shouldn't see the Exception Error message anymore.

Q I can't remember the password for my Windows Live account. Is there a way to retrieve my password and log in again?

A If you forget your Microsoft Windows Live password, it is possible to reset your password, but it's important that you first understand Microsoft's policies regarding lost passwords so that you know what options you have to retrieve your password.

Microsoft's policy is that its support staff cannot assist you in retrieving passwords for any of its products. However, there are ways that you can retrieve your own password in some Microsoft products, such as Windows Live.

If you forget your Windows Live account password, go to the Windows Live logon page and click **Forgot Your Password?** Type your Windows Live ID in the designated field and then type the characters you see in the Picture box. This helps Windows Live verify that you are an actual human requesting the password and not a malicious program trying to retrieve account information. Click the **Continue** button. From the available options, select **Send Password Reset Instructions To Me In E-mail**. Click to select the email address to which Windows Live should send your logon information. Click **Continue**. Then click **OK**.

Check your email for the message from Windows Live. If you do not see the reset message in your inbox, check your junk mail or spam folder to make sure your spam filter didn't flag the password-reset message as spam.

Once you locate the password-reset email message, click the link provided in the message. Follow the instructions on the screen to create and verify a new password for your Windows Live account.

Q I just installed Internet Explorer 7, and now I can't find the Menu bar! How can I get to the program options that are contained in menus?

A One of the first things users notice when they upgrade to IE7 is that the Menu bar is turned off by default. You can make the Menu bar appear in IE7 by pressing the

ALT key. Then you can use your mouse to navigate to the menu you want to access. After you click on a menu and make a selection, the Menu bar will disappear again.

If you would prefer to have the Menu bar always visible, click the Tools button (not the Tools menu) in IE7 and click to select Menu Bar. Once you do this, the Menu bar will be visible in IE7 just as it was in IE6.

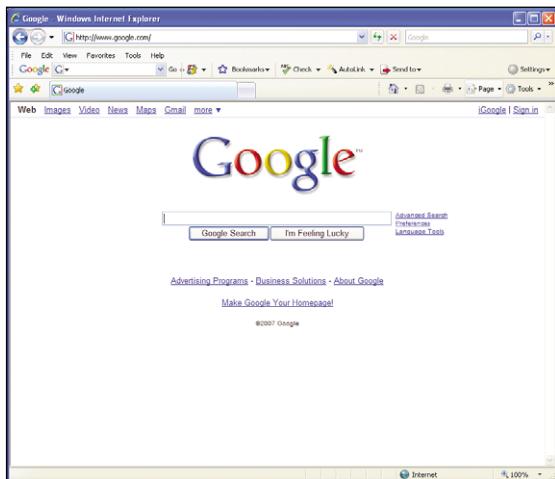
Q When I used IE6, there was a Mail button that I could click to access my email. This was handy, especially when I wanted to send a link to a Web site to someone. I can't find the Mail button in IE7, though. Did Microsoft get rid of this useful feature?

A Microsoft did remove this button from the latest version of IE. However, there are alternate ways to add this functionality back to IE7.

If you used IE6's Mail button simply to view your email, you'll want to customize IE7 so that it includes a Read Mail button on its toolbar. To do this, start IE7. Then click the Tools button (not the Tools menu), Toolbars, and Customize. In the resulting dialog box, locate and click Read Mail, which is listed under Available Toolbar Buttons. Click the Add button and click Close.

If you do not see the Read Mail button on the toolbar, make sure that the toolbar is unlocked by clicking the Tools button and Toolbars. If Lock The Toolbars is selected (noted with a checkmark), click to deselect it and unlock the toolbar. You can then click and drag the toolbar's edges to resize it. Increase the size of the toolbar until the Read Mail button appears.

If you used IE6's Mail button to send links to Web pages to others, you can regain this functionality in IE7 by using its Send A Link option. To do this, open IE7 and navigate to the Web site for which you'd like to send a link. Click the Page



Instead of clicking a Mail button to send a link or a copy of a Web page in IE7, you click the Page button.

button and click Send Link By E-mail. If, instead of sending a link, you wish to send a copy of the Web page itself, instead of clicking Send A Link, click Send Page By E-mail.

Q My PC keeps displaying the wrong time. I can go into my computer's settings and correct the time, but later, the clock displays the wrong time again. Why does this happen?

A When your computer loses time, it usually indicates that the battery on your motherboard is dying. Many people do not realize that even desktop computers use a battery. The motherboard of a computer has a small attached battery that holds some of your computer's settings and keeps the computer's internal clock running, even when your computer is turned off or unplugged. When this battery starts to fail, your computer will lose time, especially when your computer is turned off and not running off of its main power supply.

Because each motherboard uses a very specific battery, you should contact your computer's manufacturer (if you bought a prebuilt computer) or your motherboard's manufacturer (if you built the computer yourself). The manufacturer should be able to tell you what type of battery you need to buy, where you can buy the replacement battery, and the best way to have the battery replaced. **II**

Feature Package Topics

Each *Smart Computing* issue includes tips, reviews, and information about a variety of topics. However, each issue also has a featured group of articles about a selected topic. Below is a list of the Feature Packages from the previous year. As a *Smart Computing* subscriber, you have access to all of our archived articles at www.smartcomputing.com.

| | |
|------------------------|--|
| October 2006: | Uninstall Stubborn Software |
| November 2006: | Easy Answers To Your Printing Questions |
| December 2006: | Make Your PC A Computerized Media Center |
| January 2007: | My PC Won't Start! |
| February 2007: | 7 Critical Things You Should Know About Your Operating System |
| March 2007: | Resolve System Conflicts The Fast & Easy Way |
| April 2007: | Windows Vista: What You Can Expect From Microsoft's New Operating System |
| May 2007: | Set Up & Maintain A Wireless Network & Keep It Connected |
| June 2007: | Tweak & Troubleshoot Windows Vista |
| July 2007: | Clean It Out, Speed It Up! |
| August 2007: | Improve System Startup/Shutdown: Make Your PC Faster & More Stable |
| September 2007: | What To Do About PC Errors & Error Messages |



TRI-UA512 AXPC Gaming Headphones | MSRP: \$79.95 | www.trittontechnologies.com

We're Not Just Playin' Games Here

They're called gaming headphones, but with four high-quality speakers in each ear cup, it doesn't matter whether you use the AXPC headphones for games, music, video, VoIP calls, or instant message chats with the kids, you're getting the best sound around, *plus* the convenience of USB.

- True 5.1 digital audio
- Digital audio directly from USB; no sound card required

- In-line volume adjustment for front, center, rear, and subwoofer
- Removable microphone
- Compatible with Windows XP, Windows Vista, USB 1.1 and 2.0
- Carrying case

You don't need to be a gamer to love these headphones. Tritton's AXPC headphones are perfect for any

audio application and ideal for enjoying DVD movies in crystal-clear 5.1 Dolby Digital certified sound. And that's no game.

TRITTON
TECHNOLOGIES

Water & iPods

H2O Audio's Cases Make A Splash

Blaine Flamig

*Send your comments to
blaine@smartcomputing.com*



Audio For nano

\$79.95

H2O Audio
(800) 708-6080
www.h2oaudio.com

Occasionally, a product I really like will cross my path and cause me to imagine how different my days as a kid would have been if it had been around then. This happened recently after H2O Audio (www.h2oaudio.com) sent me its Outdoor Series iNR case (\$39.95) for first- and second-gen iPod nanos, along with its Sport Integration System (\$29.95) to mount the iNR to a bike's handlebars. H2O Audio had previously induced childhood what-ifs in me with its \$79.95 Audio Series waterproof nano case (video and shuffle versions are \$89.95 and \$39.95, respectively), of which I'm a big fan and avid user, as it lets me safely take my iPod into the water without destroying the music player. It's impossible to say how the iNR or Audio cases would have altered my childhood experiences, but I know they would have fit right in with my lifestyle.

I spent my childhood years in Ashland, Nebr. (www.ashland-ne.com), population 2,000 or so. As I imagine other small-town kids did in the 1970s, I habitually complained of having nothing to do. For this reason, certain events became especially special, particularly in the summer, including my early-June birthday, followed by the Fourth of July and my Uncle Gene's annual family picnic. Weeks later, Stir-Up Days would hit town with all-you-could-eat watermelon feeds, parades, and a carnival parked on Main St. (I can still picture the neon-flooded Ferris wheel spinning in the night from my bedroom window blocks away.) Toward summer's end, the rodeo took over with kids chasing greased pigs, wrangling disgruntled goats, and riding fat calves.

In between, I swam incessantly at the city pool just four blocks from my house as the road flowed. From my back door, the pool was a 1:27-minute sprint away (I timed myself regularly) but longer if I stopped to pick a green apple or two. That pool called to me—if you've survived a Nebraska

summer, you know why—and I swam so much my blond hair turned pea-green from the chlorine by June's end. Still, it's possible I would have completely wrinkled away if I'd had an H2O case back then; if there was anything I loved more than swimming, it was music. The two together? Nirvana.

I'm lucky if I find time to swim a few times a month these days, but H2O's Audio Series case greatly enhances those times when I do. After inserting my iPod, I can sink the transparent case up to 10 feet deep, and with H2O's included armband and waterproof, wrap-around Audio Headphones (\$39.95), I have the perfect companions while getting some laps in. Selecting tracks on the iPod is a snap thanks to a few excellent design touches from H2O Audio, including a Commander Scroll Wheel on the front to navigate the iPod's Click Wheel and surrounding Menu, Forward, Reverse, and Play/Pause buttons. To keep the iPod dry, the case has a LatchTight lock; interior T-Seal lining; and integrates a SealTight input to plug in 3.5mm-jack headphones, although only the Audio Headphones are compatible for water use.

Diving headfirst into water with an iPod sounds great, but it does require a leap of faith. iPods aren't exactly inexpensive, and they definitely aren't waterproof. H2O Audio seems to understand such reservations and goes out of its way to walk users through leak-testing cases before water-use. Suggested tests include submerging the case in water without an iPod for 30 minutes and then checking the interior for leaks. I take this a step further by inserting a cotton ball, tissue paper, strip of construction paper, or similar material in the case to make detecting leaks easier. Fortunately, the case has yet to fail a test. Still, performing a leak-test before each swim is good practice.

Unlike the Audio Series cases, the iNR model isn't waterproof, though it is water-resistant, meaning it's great for damp conditions when biking, hiking, camping, walking along the beach, skiing, or about anywhere else you take it. Ultimately, none of H2O Audio's cases, headphones, or water-related accessories is mandatory for iPod owners, but they definitely make time with an iPod more enjoyable, in and out of the water. ■

Window To Your World

Frame Your Digital Photos

Joshua Gulick

*Send your comments to
joshua@smartcomputing.com*



10.5-inch Digital Photo Frame ADMPF210

\$199

Aluratek

(866) 580-1978

(949) 419-6504

www.aluratek.com



10.5-inch Digital Photo Frame ADMPF110

\$199

Computer and software vendors love to tell me about how, someday soon, most family rooms will have a media center PC, and I agree with them, in part. Many family rooms will eventually have PCs that control their TVs and stereos (some already do), but media PCs have been around for years without gaining mass acceptance. I think that we won't routinely see media center PCs in our friends' homes for several years to come. The entertainment and computer industries need to work out several issues with file formats and security measures before the PC becomes our one-stop entertainment shop.

The digital picture frame, on the other hand, is one device that is ready to invade your family room. Digital frame makers don't need to worry about supporting multiple file formats, as almost all of the pictures we take with consumer cameras today are in the traditional JPEG (Joint Photographic Experts Group) format. Most importantly, digital frames solve a problem that a number of families face: Not having an easy, fast way to move digital photos off the computer (or camera) and onto a device that friends and family can view in the comfort of your family room.

I've spent the past month testing Aluratek's 10.5-inch Digital Photo Frame, which displays single photos or slideshows in a stylish frame. It can also play music and even digital videos. The Digital Photo Frame has enough internal memory (256MB) to store hundreds of photos, but what makes it really worthwhile is its built-in media card reader and USB (universal serial bus) port. You can pull your memory card out of your camera, plug it into the frame, and see your pictures right away. The card reader supports CF (Compact Flash), MS (Memory Stick), SD (Secure Digital), MMC (MultiMedia Card),

and xD (eXtreme Digital Picture Card) memory cards.

The Digital Photo Frame is very bright and offers crisp, clear images. That's not to say that it will enhance poor-quality photos—dimly lit and grainy pictures didn't get any more attractive when I loaded them onto the frame. But it certainly did justice to high-quality photos that I liked. Thanks to the size and clarity of the screen, I could easily see pictures from my couch, which is about 10 feet from the table on which the frame spent much of its time. That's exactly what I want in a digital picture frame: I want it to be big enough (and bright enough) that people will notice it from anywhere in the room and walk over to check out the slideshow or pictures it's displaying.

I like the frame's remote control, too. It's light, small, and uncluttered. I used it to find specific pictures when I was talking to friends, and I liked being able to switch from a single image back to the slideshow without fumbling for the buttons near the back of the device. The frame's on-screen menus are easy to navigate, and the frame responds to the remote control's commands quickly.

Music lovers will be happy to learn that they can listen to MP3s via the frame, which plays the songs during slideshows. That's a neat trick, and the audio quality is good. The frame isn't really very loud, but if you're standing within several feet of the frame, you can hear it just fine. The frame also plays most AVI (Audio-Video Interleaved) movie clips with clear video and sound. It handled my test movies (which have a 320 x 240 resolution) just fine, but doesn't support higher resolutions, such as 640 x 480.

Overall, the Digital Photo Frame is a winner, but that's not to say that there isn't room for improvement. If Aluratek wants its frame to support music, it really needs to add support for popular digital music file formats other than MP3—particularly Windows' WMA (Windows Media Audio) format. It also wouldn't hurt Aluratek one bit to create a frame that supports iPods. Those issues aside, the Digital Photo Frame would make a great addition to your family room. ■

Fully Functional

MFDs Make The Project

Kathryn Dolan

Send your comments to
kathryn@smartcomputing.com



PIXMA MP600

\$179.99

Canon

(516) 328-5000

www.usa.canon.com



PIXMA MP830

\$279.99

For several months, I've been compiling recipes for a cookbook of my family's favorite recipes. I've amassed about 100 recipes for dishes we've shared at family feasts. I thought scrounging for recipes and entering information in the cookbook software was the hard part, but printing turned into a massive headache. My cheapo inkjet (the cable cost almost as much as the printer) sucked in four or five sheets of paper at a time, printed a smattering of gibberish on every page, and then sat there dully in a jam.

Now, though, I'm grateful to that inept machine. Had it not failed so miserably, I'd never have looked at two MFDs (multifunction devices) from Canon: the PIXMA MP600 Photo All-In-One Printer (\$179.99; www.usa.canon.com) and the PIXMA MP830 Office All-In-One Printer (\$279.99).

Most MFDs print, scan, and copy, and some fax (the MP830 does). The Canon MFDs also print photos, and the results are amazing. Instead of a thin collection of recipes, courtesy of the scanner, I've incorporated cooking tips and notes in my late grandparents' handwriting and predigital camera photos from birthday, wedding, and holiday celebrations that feature the food fests and document our ever-growing family.

Get To It

When I get a new device, I want it working within minutes. Fortunately, both units set up quickly and easily; the hardest part was finding and removing the many pieces of orange static tape used to immobilize the devices for shipping.

After plugging the power cord into the MP600 and putting the five ink cartridges in place, I ran a test page, which looked better than anything my old inkjet produced. Next, I connected the USB 2.0 cable (not included) from my computer to the MP600, loaded the CD, and clicked the appropriate buttons to install the drivers and software. The software (ArcSoft PhotoStudio and Easy-PhotoPrint

3.5, among others) took about 20 minutes to load on my Windows XP machine. Instead of tapping my nails impatiently, I popped the SD (Secure Digital) memory card out of my camera and into the MP600's card reader and printed a couple of 5- x 7-inch pictures.

The intuitive menu, located under the pop-up, 2.5-inch LCD, walked me through selecting the pictures and let me crop and rotate the images. I selected the size, loaded the photo paper in the front cassette, and printed the pictures. The MFD could multitask. The pictures were lovely; the colors were bright and even all the way to the edges of the page, which definitely didn't happen with borderless prints on my old printer.

Slight Shortcomings

As I almost never fax anything, I didn't mind the MP600's lack of a fax component. But the hinged lids on the scanners were a letdown. You can scan books, but they'd better be thin (less than 0.8 inches). To avoid breaking the bindings on my grandma's thick, fragile old cookbooks, I scanned single pages while holding the books open at a 90-degree angle.

The lack of built-in networking capabilities didn't hamper my cookbook project, and there are workarounds, including Canon's BU-20 Bluetooth Adapter (\$49.99); although, that won't help much when I use my laptop in my family room, which is about 40 feet and a floor away from the printer.

That said, both MFDs surpassed my expectations, which may have been low, based on previous experiences, and excelled at most things I needed them to do. I loved the MP830's automatic document feeder, and the duplex feature was handy. It saved me from refeeding paper when I made copies of the cookbook for my family members. As fun as the automatic document feeder was, though, it wasn't quite enough to justify the extra \$100. The photos and pages I printed on the MP600 were every bit as good as those I printed on the MP830 and light-years beyond anything my old inkjet could have done. I found that the MP600 was perfect for my photo-printing and scanning needs, but the MP830's automatic document feeder, duplex feature, and fax component would be welcome additions to a home office. ■

I Now Pronounce Your Photos Recovered

First Advantage Saves A Wedding

Marty Sems

*Send your comments to
marty@smartcomputing.com*



First Advantage Data Recovery Services
(877) 304-7189
www.datarecovery.net

Nathan doesn't usually cry at weddings, but he did at this one.

I'm sure you know That Sinking Feeling. It's that special, "Oh, shucks," realization that you've just lost very vital data.

Say you've been dumping photos from your digital camera's memory cards to one of those little devices with a hard drive inside. You then reuse the flash cards, leaving the gizmo with the sole copies of all your photos. And then there's a clicking sound. The gadget stops working. Your photos are toast.

Now imagine you're a professional wedding photographer.

This happened to my friend, Nathan, on one of his first shoots. Needless to say, he panicked. The tech support contact for his malfunctioning SmartDisk FotoChute was responsive, but he concurred that its hard drive was dead. And like other tech products, the device's warranty was limited to repair or replacement, not recovery of lost data.

Nathan wisely turned to First Advantage Data Recovery Services. He knew that a service like this might be able to save the reputation of his business and recover his data better than do-it-yourself software. He also knew that data recovery services charge an arm and a leg—but sometimes, it's worth it.

First Advantage has a 96% success rate when recovering data from damaged or deleted hard drives, even some that have been in fires or floods. The company's newly improved process even allows it to recover data from drives with damaged system tracks (outer parts of the hard disks containing administrative data), something not all its competitors can do. First Advantage also handles USB flash drives, CDs/DVDs, tapes, memory cards, BlackBerrys, and even iPods for consumers and businesses.

After taking a look at Nathan's drive, First Advantage sent him an estimate of how much data could be recovered and how

much it might cost. (\$1,200. Gulp.) Had he decided not to do it, First Advantage would have shipped the drive back. All he would have paid for would have been shipping.

But Nathan said, "OK, go ahead," so one of First Advantage's engineers went to work. The problem was a misalignment of the drive's HRA (head rack assembly), a little arm that moves the read/write heads over the disks. Nathan's HRA could still read somewhat, but the engineer may have had to install an HRA from a donor drive.

A repair this drastic won't "fix" a hard drive, but it may last long enough for a data transfer. It usually takes First Advantage about three to five days to recover data and put it in the owner's hands. Expedited Critical Response Recovery service costs extra.

Success! Amazingly, First Advantage recovered 100% of Nathan's data, to his considerable relief. Had Nathan's drive had any damaged data sectors, not all of his photos would have been recoverable.



First Advantage then shipped Nathan the 450 recovered wedding photos on a DVD via Fed Ex Priority. First Advantage kept Nathan's 4GB of data on file for five business days in case the DVD had a problem.

"Their customer service," Nathan said, "was awesome." He sent three emails to First Advantage during the process, and "they responded within minutes of each inquiry." Needless to say, he was ecstatic to get the wedding photos back—as were the bride and groom. And they all lived happily ever after.

(Special thanks to Henri Van Parys, Charlie Walker, Don Wells, Bonnie Robertson, Christie Raines, and the unnamed, heroic engineer at First Advantage.) **II**

Video-Editing Suites

Video-editing programs continue to evolve into full-fledged suites, with every related bell and whistle crammed onto the installation discs. While this leads to a favorable feature comparison chart, it doesn't always translate into an effortless editing program. Good video-editing suites should offer nifty features but should also deliver solid reliability when it comes to the basics—editing and sharing your digital video. We'll take a look at five of the top-selling programs to see which one is really the Smart Choice.

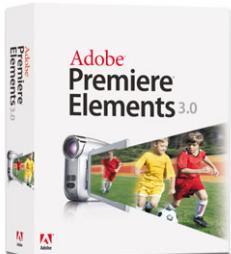
Adobe Premiere Elements 3.0

Adobe Premiere Elements is a fairly user-friendly package; it opens up with a video preview screen front and center, a scene timeline across the bottom, and a toolbox on the side. It's easy to figure out where to find

what you need, and both video clips and effects can be dragged from the toolbox to the timeline. We were on our way to making our first movie in Premiere Elements in no time. Once you've edited your movie, a big button on the toolbar leads to the DVD authoring section of the program.

Like most such programs, Premiere Elements includes two types of timeline functions. The traditional timeline is a detailed view of all the tracks, adjustments, and elements associated with your movie. The other, simplified view, which Premiere Elements calls the "sceneline," presents a slimmed-down look at the most important tracks with each clip represented by a still shot. Unless you're doing advanced editing, this is the way to construct a movie without a lot of fuss.

The program also provides full control over each aspect of your



Nero 7 Ultra Edition Enhanced

| | |
|-------------------------------------|-------------------|
| <input checked="" type="checkbox"/> | Systems Supported |
| | Windows Vista |
| | Windows XP |
| | Windows Me |
| | Windows 98 |
| | Mac |
| | Linux |



movie. Individual elements can be selected and technical specifications edited on the right side of the screen. Beginners will not need to pay much attention to these details, but more experienced users will appreciate the ability to control the video from start to finish. If you need help figuring something out, it's best to turn to the users guide because tech support will run you a painful \$39 per incident. (Support plans are available.)

Premiere Elements installed quickly and does not take up as much hard drive space as some of the more unwieldy suites. The program did run a little slowly on our machine, although none of the apps mentioned here are particularly speedy on anything but computers with an abundance of resources.

Nero 7 Ultra Edition Enhanced

With more than 20 applications tucked into one software package, you get a lot of bang for your buck with Nero 7 Ultra Edition Enhanced. Nero excels at burning, with comprehensive options covering the media gamut. You can also use it to convert audio files; capture video; edit photos; create slide-shows, mix-CDs, and disc covers; watch and record TV; and call your mother (yes, really). That's the good news.

The bad news is that you may get lost trying to find an app. In the Start menu, there's a scary array of options and applets with no direction as to where to begin. You very nearly need to stumble upon Nero StartSmart just to navigate the software, and even then, the interface isn't very intuitive. Once you've fumbled your way to video creation, Nero's tools deliver the goods, but without good documentation, the process itself can be maddening. A hardcopy manual would do wonders for Nero's usability.

The tech support hotline is only available during weekday business hours and costs \$1.29 per minute. (There's no charge for time spent on hold.) Email support is free,

but suffers some complaints for the long lag time before receiving a response. Another word of caution: Pay close attention during install because the default is to use a Nero app as the player for every type of media file. If you don't want to wait for Nero

Pinnacle Studio Ultimate 11

| |
|---|
| ✓ Systems Supported |
|  Windows Vista |
|  Windows XP |
|  Windows Me |
|  Windows 98 |
|  Mac |
|  Linux |

BUYING TIPS

Before looking into video-editing suites, take inventory of your needs. If you're a beginner with limited time to invest in learning every advanced doodad, you may want a suite that has fewer tricks, but a streamlined and user-friendly interface. For more experienced users, this might not matter as much. For everyone, solid documentation is a must.

to load just to look at a JPEG (Joint Photographic Experts Group), choose carefully.

While savvier users may make good use of Nero's first-rate features on their own, Nero's challenging navigation is too much trouble for newbies and the casual user without the aid of a third-party guide.

Pinnacle Studio Ultimate 11

Pinnacle features a large number of transitions and other effects paired with a clean interface. We wouldn't go so far as to say the interface is intuitive, but Pinnacle comes closer than most programs in this category. Many of the more advanced features are down a menu or two where they don't clutter the main screen. Workflow within the software—from capturing or importing video to exporting the final product—is fairly easy to understand and navigate. The DVD authoring process (adding scene menus and the like) was more difficult to figure out. Fortunately, Pinnacle includes an excellent hardcopy users guide with a decent index.



Pinnacle ran slowly on our machine at times, but that is not unique to this particular product. To Pinnacle's credit, it did not freeze or crash as some editors did, and the video we made turned out as expected.

One nice touch with Pinnacle is the included "green screen," a brightly colored background you can hang behind the subjects of your movies for easy "chroma key" effects. Seen on TV all the time, chroma key

lets you paste a person on top of a background. Other packages we reviewed can do the chroma key effect, but having the green screen accessory on hand makes it more likely you'll actually try it.

Pinnacle also includes complimentary email support with 48-hour turnaround (excluding weekends). All Pinnacle customers get one free phone call (you'll still have to pay your long distance carrier), but after that, it's \$14.95 per call.

Roxio Easy Media Creator 9 Suite

Roxio's suite brings together a bucketful of media tools, some with overlapping capabilities. The main menu features so many

Software Information

| | Price | Company | Contact Information | URL |
|---|-------------------------------------|-----------------|----------------------------------|--|
| Adobe Premiere Elements 3.0 | \$99.99 | Adobe | (800) 833-6687 (408) 536-6000 | www.adobe.com |
| Nero 7 Ultra Edition Enhanced | \$79.99 download, \$99.99 retail | Nero | (818) 956-5930 | www.nero.com |
| Pinnacle Studio Ultimate 11 | \$129.99 | Pinnacle | (866) 446-0833 (650) 526-1600 | www.pinnaclesys.com |
| Roxio Easy Media Creator 9 Suite | \$99.99 | Sonic Solutions | (866) 280-7694 (415) 893-8000 | www.roxio.com |
| Vegas Movie Studio 8 | \$79.95 download, \$89.95 retail | Sony | (800) 577-6642 (608) 204-7680 | www.sonycreativesoftware.com |

Scorecard

| | Features | Ease Of Use | Installation | Support/Documents | Price | Overall Score |
|---|----------|-------------|--------------|-------------------|-------|---------------|
| Adobe Premiere Elements 3.0 | 4 | 3 | 5 | 3 | 3 | 3.6 |
| Nero 7 Ultra Edition Enhanced | 5 | 2.5 | 4 | 2 | 3 | 3.4 |
| Pinnacle Studio Ultimate 11 | 4 | 5 | 4 | 3 | 3 | 3.8 |
| Roxio Easy Media Creator 9 Suite | 4 | 4 | 2 | 4 | 3 | 3.4 |
| Vegas Movie Studio 8 | 4 | 2 | 4 | 3.5 | 3 | 3.3 |

Roxio Easy Media Creator 9 Suite

✓ Systems Supported

-  Windows Vista
-  Windows XP/2000
-  Windows Me
-  Windows 98
-  Mac
-  Linux

different components it can leave you wondering which one to use. On the other hand, the suite offers many options. There's a Sound Editor that can convert audio from analog sources, such as records, into MP3s. You can copy CDs, back up media files, and more.

The main component for editing video is called VideoWave, and it works well. Links to common tasks line up on the left side of the screen. Clips play on the right side, and the timeline spools across the bottom. Like Pinnacle, the interface is not immediately overwhelming. It's not hard to grasp, from the get-go, how to take your video clips and string them together into a multimedia spectacular.

Roxio also includes MyDVD Express, a simplified video component that creates DVDs filled with clips you specify. If you don't want to spend time editing movies and just need to transfer them to DVD to show family, MyDVD is ideal.

Unfortunately, we experienced some serious stability problems. The program ran slowly and even froze a couple of times when we attempted to use MyDVD. We installed the suite on a different computer, and the MyDVD program crashed as soon as it opened. Two installs with problems indicates an issue. With problems like these, you may need to try out the free support; Roxio includes a virtual agent and Web ticket email support, as well as live phone support during business hours.

BUYING TIPS

Video-editing software can eat up a lot of space, and the actual rendering can paralyze a PC that doesn't have sufficient memory. Review the system requirements before purchasing and compare the program's needs with your own PC's available space.

Vegas Movie Studio 8

Sony's program installs fast, takes up little disk space compared to some of the monster-sized suites mentioned here, and worked without crashing our machine. The interface, however, was the most obtuse of the bunch. This is not a program novices can jump into and figure out easily. It's not obvious how to get video clips into the program, much less edit them. Take some time to learn, however, and Movie Studio delivers good results.



The program offers detailed control over almost every aspect of your video.

Movie Studio includes a separate program to author DVDs rather than incorporating it into the same interface. That's a little inconvenient, but DVD Architect Studio includes some advanced features not usually seen at this price range. For instance, you can add multiple playlists to the DVD menu to offer viewers the choice of viewing different collections of clips.

Sony's free email tech support asks a lot of detailed questions, which may make for quick diagnosis. For toll-free live support, customers must purchase a support plan. These range from \$14.95 for a single issue to Platinum Support at \$99.95 (180 days).

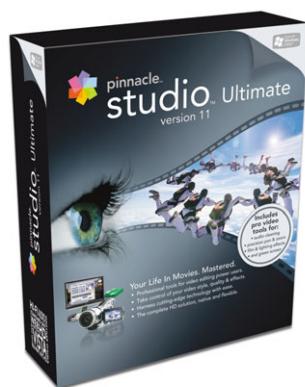
The stability of Movie Studio was refreshing, and it has a lot of tools. Anyone without experience using these kinds of programs, though, will be at a loss when they start the software and see the crowded screen.

Stable Power



All of these suites boast more features than you'd likely need. The main difference, then, is in ease of use and stability. On that score, the Smart Choice goes to Pinnacle. While there's still room for improvement, Pinnacle's logical design is easier for newcomers to understand without wading through a manual or constantly accessing the help files. ■

BY ANNE STEYER PHELPS



October 2007 Smart Choice

**Pinnacle Studio
Ultimate 11**

\$49.95

Avanquest Software

(800) 325-0834

www.avanquestusa.com

Scorecard

| | |
|----------------------|--------------|
| Performance | 5 |
| Ease Of Use | 4 |
| Installation | 3 |
| Documentation | 4 |
| Price | 5 |
| Overall Score | 4.2/5 |

Archive Important Data

Perfect Image Professional

Programs that archive files on your PC fall into two categories—backup utilities and drive-imaging programs. Both make copies of your files for later retrieval. However, drive-imaging programs can make exact mirror images of your entire system and its files. This can potentially make full-system restoration in the event of drive or system meltdown more expedient than restoring the full-system backups that backup programs create.

Perfect Image Professional is a drive-imaging program, although it can act more like backup software if you prefer. Despite a few quirks during setup that may confuse users, we think it's a good choice for archiving important files or your entire system.

Triple Play

The program has three components—AutoSave, Backup Wizard, and Perfect Image. Setup installs them all to your system hard drive, but it's a little unclear about what you are supposed to do. During setup, you can create a Rescue CD (the installation CD can also perform this function), which helps you restore your system. The setup process also runs the AutoSave Setup Wizard, which lets you determine aspects such as which files the program will back up and where you will store them.

The program recommends Typical Setup, which monitors and backs up commonly used files such as email archives and working documents. However, two other options—Backup Organizer and Custom Setup—offer more control. Custom Setup gives you access to all of Perfect Image's settings. (By double-clicking the AutoSave icon in your System Tray, you can open AutoSave to change these settings. You can also view, restore, or back up individual files or folders from AutoSave.)

Perfect Image Pro recommends you use a network drive as the backup location. Its second choice is a removable drive, such as a Jaz or Zip drive. We had neither of these, so it recommended we use the partition of an

external drive that had the most space available. Perfect Image Pro can also work with optical media (CDs or DVDs), which it can span (write across multiple disks). If you choose removable or optical media, Perfect Image Pro will save your files locally and transfer them on a timetable you set.

Forward, Not Back

Once you finish configuring AutoSave and move into normal system operation, Perfect Image Pro begins saving files based on your preferences (on-the-fly, in the background) as file changes occur. Nevertheless—and this is an important point—Perfect Image Pro does not automatically initiate a drive image or comprehensive backup at installation.

You should do this manually as soon as possible, especially if you chose during setup to back up only certain program files as they change. Otherwise, Perfect Image will not archive other files on your system. You can run Backup Wizard when AutoSave offers that option at startup or later by opening AutoSave. The wizard gives you the option of backing up all files, all work files, or a custom group of files you select.

You can also create a complete, restorable drive image from the main Perfect Image interface (select PerfectImage 11 from the All Programs menu). This interface lets you perform other tasks, such as scheduling backups or cloning a single partition (a virtual drive carved from your main physical hard drive).

There are several features we love about Perfect Image Pro, including the ability (in Custom Backup) to drag and drop files from Windows Explorer to the backup list. It also prompts you to make adjustments if your files fail to meet the parameters it sets by default.

The challenges of setting up and configuring this program are easy to overcome if you heed the warnings provided. The Getting Started Guide that comes with the boxed version helps, too. After setup, this program's automated approach makes file backup about as easy and up-to-date as possible. ■



| | |
|--|--------------------------|
| | Systems Supported |
| | Windows Vista |
| | Windows XP/2000 |
| | Windows Me |
| | Windows 98 |
| | Mac |
| | Linux |

BY JENNIFER FARWELL

Software Reviews

| |
|--|
| \$59.95 |
| Docudesk (972) 359-0655 |
| www.docudesk.com |
| Scorecard |
| Performance 3 |
| Ease Of Use 4 |
| Installation 5 |
| Documentation 3 |
| Price 2 |
| Overall Score 3.4/5 |

Convert Files

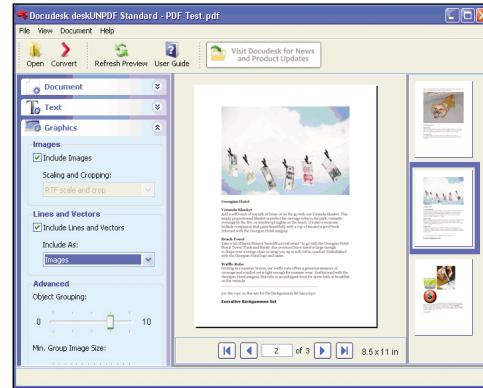
deskUNPDF

Several programs create PDF (portable document format) files from other formats. Some also convert files out of PDF. DeskUNPDF falls into the latter category.

DeskUNPDF converts only into Microsoft Word or text format but touts its ability to convert both graphics and text. We envisioned transferring complex PDFs made in desktop publishing or graphics programs into a format that would be easier for the average person to edit. Unfortunately, the results were mixed, which limits the program's usefulness.

DeskUNPDF could not convert password-protected PDF documents, a limitation we understand. However, it also balked at converting documents containing JPEG (Joint Photographic Experts Group) 2000 graphics. It was able to convert the formatting and text, but it replaced the graphics with empty space.

JPEG 2000 is an evolution of the JPEG file standard that offers better quality at smaller file sizes. It's not ubiquitous, but recent versions of Adobe Acrobat (and some desktop publishing programs) support it.



On the plus side, our formatted Microsoft Word file containing images and clip art came through fine. Consequently, we think users who work with PDFs from files originating in Microsoft Word and other less-advanced programs may be happy with this program.

However, those who need access to text and images from PDFs created for high-end production may be disappointed. Furthermore, if you need only the text from a PDF (no graphics or formatting), it's easier and cheaper to open the PDF and cut and paste the text into a new document. ■

BY JENNIFER FARWELL

| |
|---------------------|
| ✓ Systems Supported |
| Windows Vista |
| Windows XP/2000 |
| Windows Me |
| Windows 98 |
| Mac |
| Linux |

| |
|--|
| Free |
| Crawler |
| 561-989-7400 |
| www.spywareterminator.com |
| Scorecard |
| Performance 4 |
| Ease Of Use 4 |
| Installation 5 |
| Documentation 5 |
| Price 5 |
| Overall Score 4.6/5 |

Be Spyware-Free

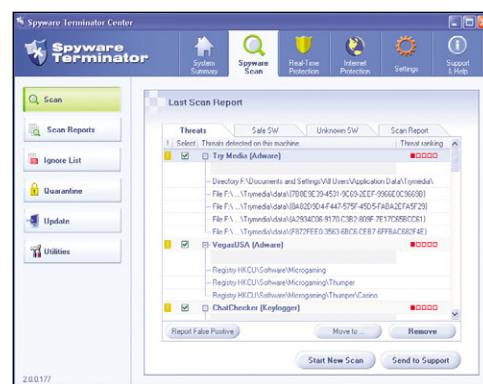
Spyware Terminator

Spyware Terminator is a free spyware scanner and real-time monitor with an optional Web site screening utility, an antivirus component, and a browser toolbar. (NOTE: For users of Windows 98/Me and 64-bit editions of Windows XP and Vista, Spyware Terminator offers spyware scanning only.)

Spyware Terminator did a good job of blocking spyware, and its scanner identified threats on our test system. It also let us choose individual items for removal. The scanner takes a cautious approach, making a System Restore point prior to removal and recommending use of programs' uninstall utilities.

Spyware Terminator registered one false positive—an "Internet nanny"-style keystroke monitor. If you use similar programs, you can mark them as safe.

Web Security Guard is a thorough but unobtrusive Web site monitor for Internet Explorer and Firefox (the company offers a download without it for users of other browsers). It lets you adjust criteria for the



types of content you consider dangerous and choose which search engines' results you want monitored. If you go to a site that fails the default or user-adjusted criteria, it displays a warning so you can leave the site or continue. It will not automatically block entrance to any site (something parents should note).

Overall, this suite does a good job of keeping the bad guys out without affecting basic functions. Note that the version we reviewed was prerelease; minor changes may occur by the time you install it. ■

BY JENNIFER FARWELL

| |
|---------------------|
| ✓ Systems Supported |
| Windows Vista |
| Windows XP/2000 |
| Windows Me |
| Windows 98 |
| Mac |
| Linux |

Staff Picks

Our Experts Pick The Best Hardware

Canon DC50

Generally, consumer digital camcorders perform poorly in low-light conditions, such as video shot at a birthday party held indoors. The low-light performance of a digital camcorder primarily depends on the size of its image sensor (the chip responsible for changing light into an electronic signal), and many consumer camcorders use an undersized .17-inch image sensor. Because the Canon DC50 features a comparatively large .37-inch image sensor, the DC50 records low-light video with more vivid and accurate color than most consumer digital camcorders. For instance, in video shot at dusk, we found the DC50 captured precise color with very little grain. Additionally, the DC50 packs 5.39MP (megapixels) onto the image sensor, so you can snap 5MP still shots when you select the camcorder's photo mode.

With Canon's Super-Range OIS (optical image stabilization), the DC50 can help remove fast vibration in your video, as well as slow shaking, such as when the wind causes your

Canon DC50

\$799

Canon

www.usa.canon.com

(800) 828-4040



body to sway. For the expert user, the DC50 includes manual controls for aperture, shutter priority, white balance, and exposure. You can choose to shoot video in either the 4:3 or 16:9 aspect ratio, and the DC50 records onto MiniDVD-R, -RW, and -R dual-layer discs. The 2.7-inch widescreen LCD makes it easy to compose shots from behind or in front of the camcorder. The only real complaint we had was that the DC50 has no external microphone input, so you'll have to use the camcorder's built-in microphone. ■

BY NATHAN LAKE

COMPUTERS

Desktops <= \$1,000
Vector GX Campus Edition
\$999

Josh
Velocity Micro
www.velocitymicro.com

Look for this back-to-school special (as of press time) on Velocity Micro's Web site. With an overclocked processor, a high-end video card, and plenty of storage, it's a college student's dream come true.

Desktops > \$1,000
Liquid Cooled Gaming Computer
\$4,987.90

Josh
Puget Custom Computers
www.pugetsystems.com

Puget Custom Computers offers a sturdy gaming PC that has all the power your college student needs to handle homework and some fierce digital battles. This PC builder's Web site is worth a look.

Notebooks <= \$1,500
Satellite P205-S6307
\$999.99

Jennifer
Toshiba
www.toshiba.com

This affordable laptop comes with 1GB of RAM, a 160GB hard drive, and DVD-SuperMulti drive.

Notebooks > \$1,500
Area-51 m9750
\$2,599

Jennifer
Alienware
www.alienware.com

Upgrade with a solid-state drive that uses no moving parts and you'll be ready for computing on the go. A solid-state drive is quieter, consumes less power, and finds data more quickly than traditional spinning hard drives.

HANDHELDS

Handhelds & PDAs
(personal digital assistants)
Mogul by HTC
\$299.99 w/discounts and contract

Jennifer
Sprint
www.sprint.com

This upgrade to the PPC-6700 operates on Windows Mobile 6. It also has an internal antenna, 2MP (megapixel) camera, and wireless high-speed data connectivity.

INPUT DEVICES

Keyboards
Natural Ergonomic Desktop 7000
\$149.95

Blaine
Microsoft
www.microsoft.com

Although expensive and large, this wireless keyboard-mouse combo has an ultra-comfortable ergonomic design and scads of shortcut buttons within easy reach.

Mice/Trackballs/Trackpads
MX Air Rechargeable Cordless Air Mouse
\$149.99

Blaine
Logitech
www.logitech.com

We haven't gotten our hands on this beauty yet, but its advanced motion-sensing abilities and incredibly handsome design have our mouths watering in anticipation.

MONITORS/DISPLAYS

CRTs (cathode-ray tubes)
E90FB
\$219

Andrew
ViewSonic
www.viewsonic.com

From what we've heard, if you're looking for a good-quality CRT that won't bust your budget, the 19-inch E90FB is an excellent choice.

LCDs <= 19 inches
VX1932wm
\$259

Andrew
ViewSonic
www.viewsonic.com

ViewSonic's 19-inch LCD performed well in our visual-quality benchmarks, displaying excellent color and grayscale gradations. The built-in speakers are also a bonus for users in cramped spaces.

LCDs > 19 inches
SyncMaster 206BW
\$349.99

Andrew
Samsung
www.samsung.com

Samsung's 20-inch LCD offers excellent color reproduction, even at the extreme dark and light ends of the spectrum. It performed well with office productivity applications, games, and movies.



Natural Ergonomic Desktop 7000
\$149.95
Microsoft
www.microsoft.com
(800) 642-7676

Natural Ergonomic Desktop 7000

There are several things to know about this 2.4GHz wireless, ergonomically designed keyboard-mouse combo. First, it lists for \$149.95, so shop around. Second, the keyboard is large and will demand extra space on

your desktop. Third, the board's design integrates an oversized wrist rest, splits the keyboard, and slopes the board at 12 degrees from the center out to force you to type at an angle. The accompanying four-way scrolling Laser Mouse 7000 is also oversized and slanted, producing more natural movements. Microsoft populated the board with shortcut buttons aimed at better productivity, including Back, Forward, Mail, and multimedia options. Further, a Zoom lever is well-placed in the center, and the Spacebar is huge. Combined, the board's characteristics add up to an excellent option for health-minded heavy typers. **II**

BY BLAINE FLAMIG

PRINTERS

Inkjet <= \$150
Stylus Photo R380
\$129.99

Kylee
Epson
www.epson.com

Inkjet > \$150
PIXMA iP6700D
\$179.99

Kylee
Canon
www.usa.canon.com

Laser <= \$200
PagePro 1400W
\$119.99

Nathan
Konica Minolta
www.konicaminolta.com

Laser \$200 to \$500
1320c
\$299.99

Nathan
Dell
www.dell.com

Laser > \$500
C534n
\$699

Nathan
Lexmark
www.lexmark.com

MFDs (multifunction devices)
Stylus Photo RX580
\$149.99

Kylee
Epson
www.epson.com

This printer features a 3.5-inch color LCD for previewing photos and navigating menus. You can also print directly to printable CDs and DVDs.

With its 3.5-inch color LCD, you can preview your photos before you print. In addition, the iP6700D supports double-sided printing.

This affordable monochrome laser weighs only 15.6 pounds (with the toner cartridge) and produces monochrome prints at 17ppm (pages per minute).

This color laser churns out 12ppm in color and uses the Dell Toner Management System to indicate when a toner cartridge is low, so you can buy a replacement cartridge before you run out of toner.

To produce high-quality color business graphics, the C534n features a 4800 Color Quality mode. Additionally, the C534n includes color management software to help reduce the cost of the color prints.

This MFD is easy to set up, easy to use with its 2.5-inch LCD, and features Epson's new Claria inks that are designed to keep prints color-rich even as time passes.

STORAGE

Flash Memory & Portable
Flash Survivor GT 8GB
\$129.99

Marty
Corsair
www.corsairmemory.com

It's an 8GB instead of a 16GB model, but it's blazingly fast and extremely rugged. It has 256-bit AES (Advanced Encryption Standard) and a 10-year warranty, too.

CD & DVD Drives
LH-20A1H
About \$40

Marty
Lite-On
us.liteonit.com

20X DVD±R writing is the highlight of this LightScribe-capable burner.

Hard Drives
Deskstar 7K1000 1TB
\$399

Marty
Hitachi
www.hitachigst.com

The first terabyte (1,000GB) hard drive is almost as speedy as a Western Digital Raptor, but with nearly seven times the capacity. Also available with 750GB.

VIDEO/PHOTO

Digital Camcorders < \$500
DCR-DVD108
\$499.99

Nathan
Sony
www.sony.com

This digital camcorder records directly to DVD, features a 40X optical zoom, and utilizes Sony's Super SteadyShot Image Stabilization system.

Digital Camcorders > \$500
DC50
\$799

Nathan
Canon
www.usa.canon.com

This digital camcorder performs admirably in low-light conditions and produces excellent video quality. Additionally, the DC50 captures 5MP still images, so you wouldn't have to carry a separate digital camera for photos.

Digital Still Cameras - Point & Shoot
PowerShot A640
\$399

Kylee
Canon
www.usa.canon.com

This 10MP camera features 4X optical zoom and a 2.5-inch LCD. This is an ideal camera for those who prefer to use AA batteries.

Digital Still Cameras - Adv./Prosumer
D40 D-SLR
About \$600

Kylee
Nikon
www.nikon.com

The 6.1MP D40 appreciatively mixes friendly operating controls with shooting abilities that go beyond point-and-shoot.

Graphics Cards <= \$150
ATI Radeon HD 2600 XT
\$149

Andrew
AMD
ati.amd.com

The Radeon HD 2600 XT offers great midrange performance, even in Vista, not to mention it's DirectX 10-capable for playing new and upcoming games.

Graphics Cards > \$150
GeForce 8600 GTS OC2
\$239.99

Andrew
BFG
www.bfgtech.com

BFG's newest overclocked GeForce 8600 gets some new duds in the form of a custom cooler and, as a result, manages to perform better than ever in games and 3D-intensive applications.

Go Back In Time With WinXP's System Restore

Imagine if whenever you made a mistake or something went wrong in life, you could pick a point a week, a day, or even an hour earlier and go back to avoid whatever caused the problem. Life doesn't really work that way, of course, but when you have a problem with a Windows XP system, there actually is a way you can turn back the clock and undo the damage.

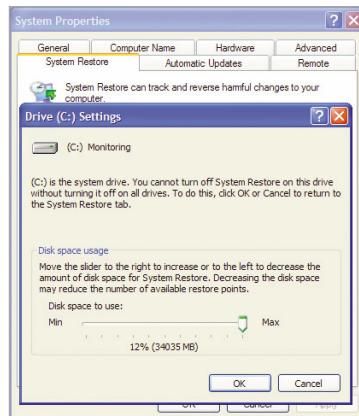
Just as you can record a particular moment by taking a photo of it, it's also possible to take "snapshots" of your WinXP system's configuration. There are several third-party utilities that can do this, but you need look no further than System Restore, a feature built into WinXP. System Restore will periodically and automatically save snapshots of your system—called restore points—so that in the event something goes wrong, you can use the restore point to return your system to its earlier working condition.

System Restore is a handy way to get your system working properly again after it suddenly has a problem or becomes unstable, especially when the trouble seems to stem from something that recently happened—a changed setting, operating system update, installed application, etc.

Understanding Restore Points

A restore point basically consists of a copy of your Windows Registry, along with other critical or otherwise important operating system files (including those with .EXE, .DLL, .SYS, and .INF extensions, just to name a few). System Restore works by staying in the background and monitoring your system, creating restore points whenever certain system events are detected. Some of the things that trigger restore point creation are downloads from Windows Update (even if it's done automatically), the installation of an unsigned device driver (one that hasn't been certified by Microsoft), and in many cases, installation of an application.

Even if no system events trigger their creation, System Restore will still create automatic restore points every 24 hours or so. These daily restore points are only created when your system is on and idle—that is, when there is no



System Restore can reserve up to 12% of your hard drive space for restore point storage.

keyboard/mouse or disk activity—so the exact interval between restore points may vary somewhat.

System Restore will even let you create restore points manually whenever you want to. This may seem unnecessary given how often restore points are automatically saved, but application install routines must behave in a certain way in order to trigger a restore point, and thus not all installs do so. This is especially likely when installing downloaded shareware and freeware programs, but it's not a bad idea to get in the habit of creating a manual restore point prior to installing any application on your system.

Before we delve into exactly how to use System Restore, let's cover a few caveats.

Although System Restore will create automatic restore points no matter who is logged on to a system, only the system administrator can create manual restore points, access a saved restore point, enable/disable System Restore, or modify its settings.

It's also important to note that System Restore doesn't concern itself with user-created files such as those in My Documents. That's good because it means that using a restore point won't change any of your personal files, but it also means you can't use System Restore to recover, say, an accidentally modified or deleted document. System Restore isn't a substitute for regularly backing up your important data.

Finally, when you suspect that the installation of an application, driver, or OS (operating system) update is the cause of your system woes, before using System Restore you should first try to uninstall it via Add Or Remove Programs. Having said that, System Restore is an excellent way to recover from situations when an install/uninstall routine crashes in the middle of the process.

Reserving Disk Space

System Restore is enabled by default in all versions of WinXP and will run automatically, provided there's at least 200MB of free hard drive space available. (If available disk space falls below that amount, System Restore will shut down until the space frees up.)

To verify that System Restore is active, click Start, right-click My Computer, click Properties, and select the System Restore tab (the box labeled Turn Off System Restore should be clear). From here, you can also change the amount of space System Restore is using. The default amount reserved for restore points is 12%; the maximum you can set aside on a disk. You can use the Disk Space Use slider bar to adjust the amount of System Restore space, though even if you slide it all the way down, it will still use the minimum 200MB.

If your system has multiple hard drives or partitions, you'll see them listed along with a Settings button. Highlighting a particular drive and clicking this button will let you configure each drive separately or turn System Restore off for specific drives (such as for those you use to store data only).

Naturally, the more space you can set aside for System Restore, the more restore points can be saved. System Restore uses the first-in-first-out method for storage, so if it ever gets short on space, the oldest restore points will be deleted to make room for new ones.

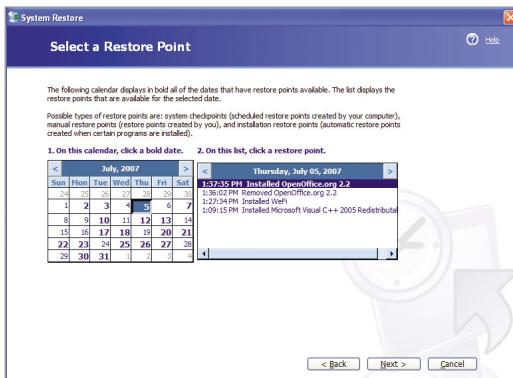
Creating Restore Points

To create a manual restore point, open the System Restore application by clicking Start, All Programs, Accessories, System Tools, and System Restore. Then select Create A Restore Point and click Next. Now type a descriptive name for the restore point into the box provided and click the Create button. Within a few moments, a dialog box will appear confirming the restore point's name, date, and time.

If you want to automate the creation of a restore point at a particular time of the day, use WinXP's Scheduled Tasks feature. Start by opening Scheduled Tasks from the System Tools group we directed you to above. Then, double-click Add Scheduled Task and click Next. Scroll down to highlight System Restore and click Next again, and from there, choose the frequency you want to use and follow the prompts to set up a schedule.

Using Restore Points

To access a saved restore point, open System Restore as described earlier, select Restore My Computer To An Earlier Time, and



When you highlight a day in System Restore's calendar, you can choose from the restore points saved on that day.

click Next. (If other users are logged in to the system, you'll receive a warning about logging them off before going further.) Select a day on the calendar on the left, and any restore points saved for that day will be displayed on the right.

Automatic daily restore points will be called "System Checkpoint," while the rest will be labeled either with a name you provided or something like "installed x" or "removed y" (where x or y is the name of a driver, update, or application). After high-

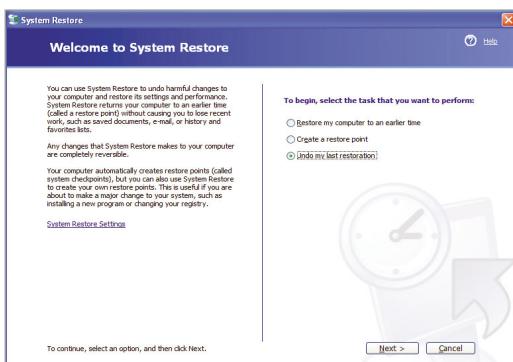
lighting the restore point you want, click Next and then confirm the restore point in the following window by clicking Next again. System Restore will then shut down Windows and load the restore point, and when Windows restarts, you'll see a Restoration Complete message, after which the system will be ready to use.

If a restore point doesn't solve your system problem or produces any unexpected/undesirable effects, you also have the option to undo the restore process. Just return to System Restore, select Undo My Last Restoration, click Next, and follow the prompts. (NOTE: You can only undo the last restore you performed.)

If your system's problems prevent your normal Windows configuration from starting, you can run System Restore from Safe Mode. Access Safe Mode by selecting it from the menu you get when pressing F8 during your system's boot process (before you see the Windows XP Logo). After you select Safe Mode, press ENTER, and log in, you'll see a dialog box telling you to click No if you want to use System Restore. Click No and proceed as described above. Before running System Restore from Safe Mode, you can also try to load Windows' Last Known Good Configuration option, which is available via the same F8 menu.

If you ever decide that you don't need System Restore, turning it off will free up a lot of disk space (and maybe speed up your system a tiny bit). Just be advised that this will erase all of your saved restore points.

There you have it. System Restore is a quick and easy way to get WinXP back on an even keel after a problem and is a lot faster and more convenient than having to reinstall Windows from scratch. ■



If you don't like the results of a restore, System Restore will let you undo the process.

Windows Live Messenger & Windows Messenger

Two Oft-Confused Applications Are Very Different

While the names of Windows' Messenger service and Windows Live Messenger sound similar, the functions they perform are quite different. Messenger service was created for Microsoft network system administrators as a network-based system notification service and has been included in the Windows OS (operating system) since Windows 3.0. The service is used to connect with a LAN (local-area network). Through this connection, your computer can receive up-to-date information and notifications from system administrators about the status of your network.

WLM (Windows Live Messenger), on the other hand, is the end-user chat and instant messaging client that replaced MSN Messenger. The application is available for download at messenger.live.com. Windows Live Messenger allows you to communicate in a variety of ways with friends in your contact list, including standard text-based instant messaging and voice and video chat.

While performing their duties, Messenger and WLM consume a fair amount of resources, which can cause your computer to operate slowly. Perhaps even worse, Messenger and WLM can be security risks, allowing unwanted advertisements to reach the computer through ports opened by the applications. Internet advertisers can use the ports used by Messenger service to send pop-up advertisements to connected computers. The pop-ups open in a window entitled Messenger Service. This security breach gives malicious software an opening into the computer by which it can begin attacking the OS.

The possible problems caused by Messenger and WLM have a remedy, however. You can easily shut off the notifications and advertisements you receive from Messenger and restore those resources to your computer to ensure its optimum performance.



Say Goodbye To A Bad Friend

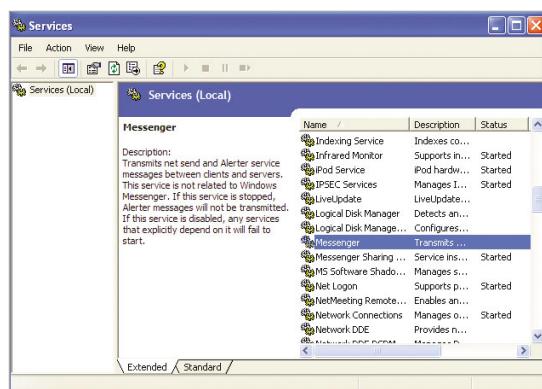
Generally, Messenger service automatically boots whenever you log in to Windows. As soon as it detects a connection with another computer, Messenger communicates with that computer. Messenger service opens ports to do this, sending and receiving commands and notifications from the network. The notifications will appear in the lower-right corner of the screen in the aptly-named Notification Area.

This background service consumes memory and slows your computer's operations. When this happens, Windows will notify you that it is running low on memory instead of shutting down Messenger. In fact, Windows will recommend that the user close user applications, rather than the Messenger service, so that the OS can maintain the connection initiated by Windows Messenger.

Microsoft has identified this problem and attempted to fix it by discontinuing the Messenger service in later versions of Windows XP and Windows Vista. Until you upgrade your system to Vista, Microsoft recommends that users disable Messenger if they use WinXP on a home or small office computer.

First, to test the security of your computer's firewall against any software that may try to enter your system through Messenger, click the Start menu and then the Run option. Enter cmd.exe in the dialog box to open the command prompt. When a new window opens, enter the following command: net send 127.0.0.1 hi. If your computer receives a pop-up message that reads "hi," then Messenger is active and Microsoft recommends that you take measures to disable it.

To do so, begin by clicking Start and locating the Control Panel. Under Performance And Maintenance,



The Services option within Administrative Tools allows you to choose which operating system services to enable or disable.

double-click Administrative Tools to access a list of options that allows customization of your computer. Find Services and double-click Messenger. Here you will see four options: General, Log On, Recovery, and Dependencies. Under General, click the drop-down menu for Startup Type.

Automatic is the default setting for Messenger Service; Manual will allow you to launch the service at the time of your choosing; Disabled will keep Messenger from connecting to any network that the computer detects.

By clicking Disabled, you will shut down the service until you choose to enable it once again. Now, your computer will be able to devote those resources to performing other tasks, and your system will also be protected from malware trying to enter your system through Messenger service.

Disabling WLM: What You Should Know

Windows Live Messenger operates via .NET Web sites, including Hotmail and MSN.com. Accessing WLM through your Hotmail or MSN.com email allows you to use the end-user instant messaging client to use text-based chat or communicate via voice or video chat. You can choose never to download WLM in the first place, but if you have installed it on your computer, it is possible to disable its connection to the Internet or to completely uninstall the application. We'll cover both approaches.

To stop WLM from establishing a connection to the Internet automatically but keep it installed for occasional instant messaging and access to its other features, open WLM and select Tools and then Options. Here, WLM will offer a few different options. Along the left side of the window, click General and find the Sign In heading. To run WLM only when you choose, uncheck the box next to Automatically Run Windows Live Messenger When I Log On To Windows. Now, WLM will not begin running until you manually select it either from the Desktop or the Start menu.

You can also choose when you want WLM to connect to the Internet. WLM's default setting is to automatically connect to your .NET passport whenever an Internet connection is detected. To disable this, follow the steps listed above and then uncheck the box marked Allow Automatic Sign In When Connected To The Internet.

If you tried WLM and decided that it's not for you, you can uninstall the program

through the Add Or Remove Programs option in the Control Panel. When the list of programs appears, select Windows Live Messenger. An Uninstall wizard will automatically launch and uninstall WLM.

Free Yourself (& Your Computer)

You can protect your system and maximize your computer's performance by disabling the Messenger service and Windows Live Messenger. Doing so will increase your available resources and also help protect your computer against malware attacks. ■

BY CHRIS DUNKER

Keep It Simple: Disable Unused Services

The Windows Messenger service isn't the only service that eats up resources and poses a security risk in Windows. Several other behind-the-scenes services occupy memory that could be used otherwise. These (mostly useless) services can easily be disabled. To do so, click Start and then Run. In the Open field, type **services.msc** and click OK.

In the Services window, you will see a list of all services that run in Windows. Clicking the service will show a brief description of the service's job. Also, you can see the current status of each service: Automatic or Manual, Enabled or

Disabled. By right-clicking any service, you can toggle its options.

Use caution when changing the status of services, as some services need to be enabled in order for your operating system to function properly. Disabling the wrong service can cause your system to fail. General rule of thumb: If you are unsure of what the service does, do *not* disable it. See www.theeldegeek.com/services_guide.htm for a handy, easy-to-use guide to which services can and can't be disabled.

The following services are usually safe to disable, and doing so will help conserve system resources:

- ClipSrv:** This service allows you to store files on another computer connected to your network. This service can be integral in a business office setting where files are stored on a network, but has no purpose on most home computers.
- ERSvc:** Error Reporting Service will send a report directly to Microsoft if an application crashes. However, this service does not actually *fix* the unresponsive program, which is why it can be disabled.
- Netlogon:** This service connects your computer with a network. It's not required for most home computers because logon services are provided by your Internet service provider.
- TlntSvr:** Telnet is a remote login service that creates a security hole by allowing users to access the computer from a remote location. This service is unnecessary and potentially dangerous for the home computer.

Disabling these services will help your computer run smoothly and securely and help ensure a more positive experience with your Windows OS (operating system).

Music + Computing =

Plenty Of Audio-Related Possibilities

No matter your walk of life, music affects us all. Whether it's a song that induces tears of joy or sorrow, years of faithful companionship from an instrument, or the sensation of dropping the needle on an LP and drowning in the glorious analog audio that lilted off the turntable, music is one of life's greatest gifts. Music, and audio in general, also has an indelible place in computing, although perhaps in some not-so-obvious aspects.

Sure, you know you can burn audio to CDs/DVDs and take much, if not all, of your digital music library wherever you go via an iPod. You also know you can add audio to home DVDs, photo slideshows, and PowerPoint presentations. Still, audio and computing offer many more possibilities, some of which we'll describe here. Keep in mind, though, that many high-end multimedia tasks require significant processing power to pull off effectively and efficiently. A modern CPU and plenty of storage and memory will help greatly to make the experience more enjoyable.

Further, although a standalone sound card isn't mandatory due to the abilities that audio chipsets integrated on today's motherboards offer, a

sound card typically offers superior audio quality and input/output options. (For more information, see the "Why A Sound Card Pays Off" sidebar.) Additionally, we could devote every page of this issue to audio-computing projects and still not do them justice.

Nonetheless, the following should give you an idea of what's possible.

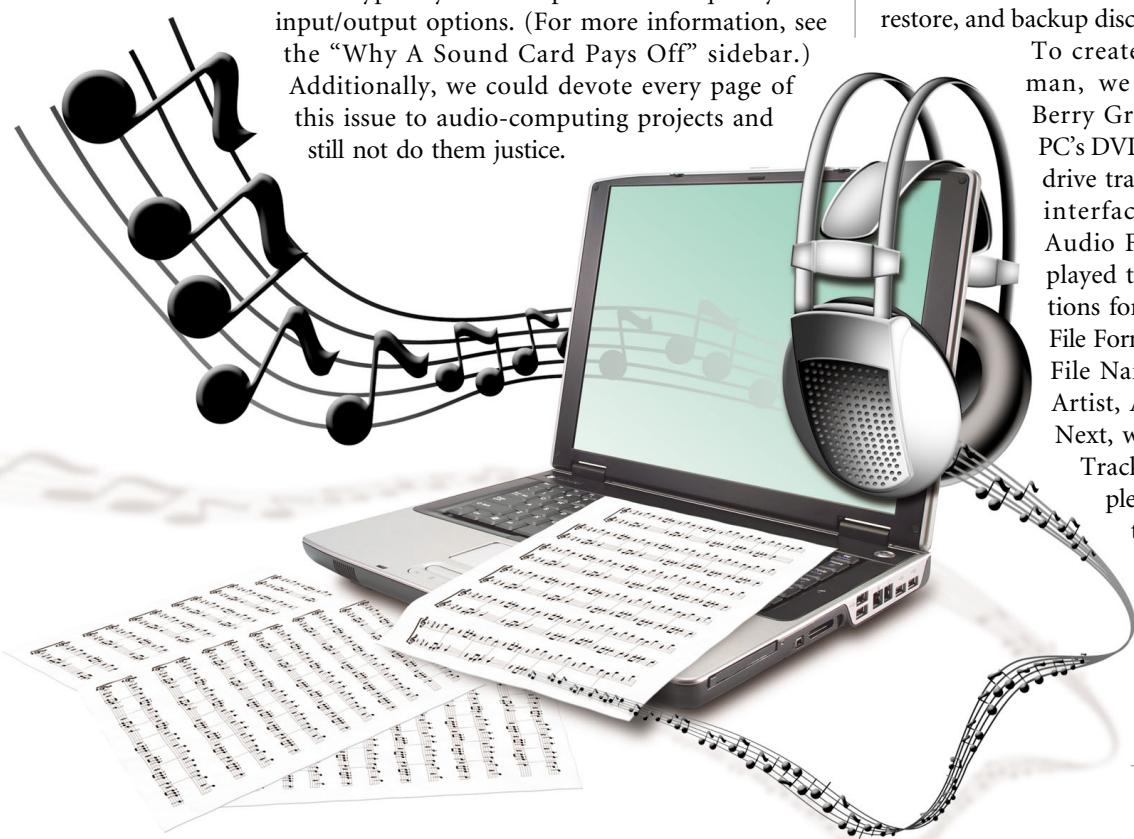
The Art Of Burning

Years ago, burning audio CDs was the rage. Today, MP3 players make storing, transferring, and playing digital music much easier. Additionally, hard drives now offer so much storage so affordably, that archiving your music to disc isn't mandatory. For non-MP3 player owners, though, burning audio CDs is handy for playing mixed playlists among several stereo systems, including home and car systems. Further, you probably already have WMP (Windows Media Player) installed on your PC, giving you a free tool to rip and burn your music. If not, WMP11 is available at www.microsoft.com/windows/windowsmedia. We detailed the burning process using WMP10 in "Burn CDs In WinXP With WMP10" (see the September 2006 issue of *Smart Computing*), and the process is nearly identical for WMP11.

Additionally, many manufacturers offer alternatives. We used Honest Technology's Fireman CD/DVD Burner 3.0 (\$19.99; www.honesttech.com) for this article. Similar to such apps as Nero 7 Ultra Edition (\$79.99; www.nero.com) and Roxio Easy Media Creator 9 (\$99.99; www.roxio.com), Fireman provides tools to create audio, MP3, and WMA (Windows Media Audio) CDs/DVDs; utilities to create data, video, restore, and backup discs; and much more.

To create an audio CD in Fireman, we inserted our "Chuck Berry Greatest Hits" CD in our PC's DVD-RW (DVD-rewriteable) drive tray. From Fireman's main interface, we selected Import Audio From CD. Fireman displayed the CD's tracks with options for Output Folder, Output File Format (we chose MP3), and File Name Structure (we chose Artist, Album, Number, Title). Next, we clicked Import Audio

Tracks, which Fireman completed in a few minutes. We then returned to the main interface, selected Create Audio CD, clicked Add, browsed to our folder that stored our ripped Chuck's tunes, selected the tracks, clicked



Add, and clicked OK. Fireman provided an option to rearrange the tracks and detailed the disc space needed to burn the songs. After inserting a blank disc, we clicked Next and then Burning, and Fireman went to work.

Transfer LPs The USB Way

If you're like us, you still spin LPs and prefer the analog sound it produces over digital replications. Still, albums will never be convenient for listening to music away from home. You can't exactly stick a turntable in your back pocket, after all. Further, few of us can afford to replace our entire LP collection with CDs or digital downloads. There are several cost-effective solutions, however, to move your LP's tracks to digital files, including a newer method using the ultra-convenient USB port.

Ion Audio's (www.ion-audio.com) line of USB turntables, including the newer TTUSB05 (\$149.99) and TTUSB10 (\$249.99), only require connecting the device to your PC with a USB cable and using the included MixMeister EZ Vinyl software to transfer album tracks to digital files. The TTUSB10 can even convert 78rpm (revolutions per minute) records via the included software, and it has a Line-In input to connect and record from a cassette deck. Both turntables also have RCA output jacks for use with a home-stereo system and can transfer files directly to iTunes. Ion Audio also makes a battery-powered iPTUSB model (six D cells; \$99.99) that includes a built-in speaker and can also connect to stereo systems. For cassette aficionados, the company should have a dual-deck TAPE2PC option available by the time you read this to transfer tapes to MP3s.

If buying a new turntable isn't appealing, a homebrewed method can also do the job, although it's more time-consuming and involved. On the positive side, it only costs a few dollars. To save space, we'll refer to "Connect Your PC To A Stereo" (see

the December 2005 issue of *Smart Computing*) for the exact steps. Essentially, though, unless you have a sound card with RCA inputs to plug your turntable, cassette deck, or stereo receiver directly into, you'll use your PC's Line-In jack (usually blue and at the back of your PC) to connect your audio component. The easiest connection method is using a Y-adapter cable (available at most electronics retailers), which has two RCA jacks at one end for the turntable connection and a 3.5mm jack at the other for the computer's Line-In connection.

You'll also need software to convert the album's analog data to digital. Windows Sound Recorder (in Windows XP, click Start, All Programs, Accessories, Entertainment, and Sound



Ion Audio's iTTUSB05 and iTTUsB10 USB-based turntables may be the easiest method for transferring LP songs to digital files.

Recorder) can do the job, but recordings are typically weak and distorted. For this article, we used Ableton's high-end Live 6 software (\$499; www.ableton.com) and the freely available Audacity (www.audacitysourceforge.net). We connected our turntable using both our PC's Line-In input by way of a Pioneer stereo receiver and a Creative Audigy Sound Blaster Audigy 2 ZS Platinum sound card.

Although it's technically not a computing project, we'd be remiss if we didn't mention TEAC's retro-looking GF-350 (\$499.99; www.teac.com), which burns albums to CD-R/RW

(CD-recordable/rewriteable) discs via a built-in turntable (33-1/3, 45, and 78rpm), software, and CD recorder. It also burns CDs from other analog devices, including cassette players. Further, the GF-350 has an AM/FM radio, an LCD to monitor recordings, and 3-inch stereo speakers.

Virtual Jamming

Few things beat getting together with fellow musicians and riding a groove for all it's worth. Unfortunately, finding jam time isn't always possible. Collaborating musically online with others, though, is a good substitute. For example, after creating a user profile at eJamming (free but in beta; www.ejamming.com) and downloading its proprietary AUDiiO

software to a WinXP or Vista system, you can play, record, or jam in near real time with up to four players. You need a compatible microphone, input option for an audio or MIDI (Musical Instrument Digital Interface) instrument (another example of where a sound card pays), and proper ASIO-driver support. We used a Creative Sound Blaster sound card to connect a Fender Stratocaster and M-Audio Session Keyboard to our PC.

A broadband Internet connection is also a must for eJamming, otherwise the latency (time between when you strum a chord and others hear it) will be too great to really enjoy the experience. eJamming is still a work in progress, so expect a few hitches. Our biggest obstacles were establishing a connection and adjusting to the synchronization technology eJamming uses to slightly delay an instrument's audio so that it's in sync with the other players' audio. Still, jamming and recording in public and private sessions offers great potential.

Jamglue (www.jamglue.com) is also an online audio tool in the early stages, but it takes a different approach. Rather than jamming with others, you use a Flash-based mixing app from a Web browser to collaborate on

creations others have uploaded and vice versa. Jamglue is drag-and-drop easy, but you'll probably need a few hours to get acclimated. If you aspire to mix and record your own audio in a home studio, however, Jamglue is a good introduction to editing software that doesn't have nearly the learning curve as higher-end applications.

Time For Your Online Lesson

Time-wise, music lessons aren't always convenient. With an Internet connection, however, lessons for nearly any instrument are just a Web browser away. Many sites we use regularly include audio and video clips to hear and see instructions. Surprisingly, one such resource is YouTube (www.youtube.com), where instructions from actual teachers and advanced players are available. YouTube's strength is its video-oriented approach, which, in this case, means seeing techniques, fingerings, and tips from other musicians.

Using Chuck Berry again as an example, typing **Johnny B. Goode** lesson in YouTube's Search field returns several videos, including an excellent

step-by-step lesson covering the song's intro. Although YouTube's lessons vary in quality, they're available for nearly any instrument, including clarinet, drums, saxophone, trumpet, standup bass, and bagpipes.

Other online lesson sources we use regularly include BerkleeShares.com, part of the Berklee College of Music; The Wood Fingering Guide (www.wfg.woodwind.org), which has printable fingering charts; and WorldWideLearn (www.worldwidelearn.com/online-courses/music-courses.htm), a central depository of lessons.

Record Your Own Music

Recording and editing your own music on a computer can be overwhelming due to the staggering amount of loops, effects, MIDI samples, and track-tweaking options most programs provide. Stick with it, though, and recording and mixing audio is one of the most rewarding things you can do on a PC.

For this article we primarily used M-Audio's Fast Track USB Instrument and Effects Hub, Session software,

and Session Keyboard (www.m-audio.com). The hub lets you bypass needing a sound card to connect a microphone and audio and MIDI instruments to a PC by using a USB cable instead. Session is also among the most user-friendly audio editors we've used. We also used Ableton's pro-level Live and Steinberg's excellent Sequel (www.steinberg.net) applications, and both offer tons of audio loops, effects, and arranging and tweaking tools.

After installing Session and drivers for the hub, we were able to compose songs by building tracks one on another. For example, for one song, we plugged our Stratocaster into the hub's guitar port and MIDI keyboard into the MIDI port and recorded several separate rhythm and solo guitar tracks and MIDI effects. From Session's bundled loops and effects, we added bass riffs for verse and chorus sections; several drum and other percussion patterns; and such effects as gun shots, synthesized voices, and more. Session also let us choose among many guitar effects from many styles. Further, we could tweak root notes, mute other tracks when recording solos, and much more. After finishing the composition, we were able to export it as an MP3 file and add it as backing music to a photo slideshow we burned to DVD.

The more audio you record, the more

likely you'll be to eventually want to use notation software to write, transcribe, and print your music. A few good options include Make-Music's Finale programs (www.makemusic.com), including its free

Notepad 2007, and Sibelius' programs (www.sibelius.com), including the great G7 (\$99) for creating guitar tablatures and the comprehensive Sibelius 5 Professional (\$599) for writing and printing music. ■

Why A Sound Card Pays Off

The chipsets in today's motherboards have come a long way in terms of networking, video, and audio abilities. Still, most audio experts would agree that a standalone sound card offers superior audio quality and input/output choices, including Line-In, Mic-In, Digital-In/Out, AUX, SPDIF In/Out, MIDI In/Out, and stereo and 3.5mm headphone jacks. Among consumer brands, Creative's Sound Blaster (www.soundblaster.com) card line is king. Models include the

high-end X-Fi Elite Pro (\$299.99), Xi-Fi Platinum Fatal1ty Champion (\$199.99) for gaming, Audigy 4 Pro (\$99.99), and Audigy SE (\$29.99) in various internal, external, and breakout box versions. Internal cards fit into a PCI motherboard card slot, external versions connect to a USB port, and breakout boxes occupy an empty drive bay. Breakout and external versions typically offer more inputs/outputs, dedicated

dials, and other easily-accessible options. Further, Creative's new X-Fi cards include onboard RAM to off-load processing tasks from the CPU and proprietary technologies to compensate for losses in digital audio fidelity due to compression. Overall, if you're after the best

audio quality possible, a sound card is the way to go. ■

BY BLAINE FLAMIG

Adventures In VoIP

A Glance At The Ups & Downs

The allure is unmistakable: Ditch your traditional, expensive landline phone account for a VoIP (Voice over IP) account that will run about \$25 monthly for unlimited calling. But while the benefits of this emerging technology are tempting for consumers, early adopters are finding that there are pitfalls to VoIP.

VoIP allows voice communication to be delivered over the Internet or any network that uses IP (Internet Protocol). The services vary, but the technology has evolved nicely, such that the average VoIP service generally resembles that of traditional POTS (Plain Old Telephone Service). Adapters allow customers to use their existing analog phones over the digital service, and, in many cases, customers can port their existing POTS telephone number to a new VoIP service.

Somewhat Peachy

The VoIP protocol gathered steam in the mid-1990s as a method for handling voice communication across the Internet. VoIP remained a niche technology for years, primarily seeing use with **softphones** (software that allows users to make calls on their computers, usually with an accompanying headset). By 1998, services appeared that provided the ability to make telephone calls from PCs to phones, followed by services that allowed phone-to-phone calls, though connection reliability and call quality left plenty to be desired.

When routing and switching breakthroughs—which make the technology less PC-dependent—were introduced by manufacturers such as Cisco and Lucent, VoIP officially became a mainstream alternative to POTS. Connection and voice issues

were also heavily scrutinized in the early 2000s, but now many users enjoy service that's often indistinguishable from their previous POTS accounts.

In fact, most VoIP providers include features in their standard packages for which landline providers, such as Verizon, charge a premium. For example, the average VoIP consumer account includes caller ID, call forwarding, call waiting, anonymous call rejection, and number blacklisting.

Costs for residential VoIP service range from \$15 to \$30 monthly, which doesn't include a one-time activation cost (usually up to \$30). On the low end are accounts that include unlimited local calling and a fixed number of long-distance minutes, while the high end boasts accounts with unlimited local and long-distance calling and unlimited international calls. Some providers also offer one-year plans that charge about \$200 up front for unlimited calls throughout the year.

Some services do away with traditional analog phones altogether. With Skype, for example, customers can use



Some VoIP (Voice over Internet Protocol) services allow their customers to use Wi-Fi phones, such as this Belkin model, to send and receive calls from anywhere in the world where there's a wireless hotspot.



a Wi-Fi-enabled phone to connect to their wireless routers. Depending on the plan, customers can use their phones anywhere in the world if they're connected to a Wi-Fi hotspot.

Not A Bowl Of Cherries

For all of its tangible benefits, VoIP has plenty of drawbacks. The top provider of VoIP in the United States, Vonage, is rumored at press time to be on the brink of bankruptcy after legal wrangles with Verizon earlier this year.

Those pointing to the dangers associated with VoIP can look no further than SunRocket, which closed shop without warning in July, leaving 200,000 phone customers with limited or no service. Because VoIP is relatively new, it remains mired in murky legislative waters where other laws governing utilities don't necessarily apply. As a result, customers face the possibility that their VoIP service can suddenly disappear, with no explanation offered.

VoIP users also struggle with faxing, which may or may not work with their service. Also, 911 emergency service doesn't exist with all VoIP services. Finally, VoIP users must prepare themselves for the potential of outages due to electrical blackouts, Internet connectivity problems, or other equipment-related issues.

Looking Ahead

VoIP has its share of exciting features and scary drawbacks. Customers willing to risk a rollercoaster-like ride with their phone service are certain to enjoy the immense savings enabled by VoIP, along with functions not found with traditional phone services. More conservative phone customers, on the other hand, are more likely to wait for the VoIP market—and the technology—to stabilize before jumping in. **II**

READERS' TIPS

COMPILED BY JOY MARTIN

Many of our readers come across fast, easy ways to solve a problem or accomplish a task. Well, we'd like to hear about it! If you have a great tip you'd like to share, email us at readertips@smartcomputing.com. If we print your tip, we'll send you a free *Smart Computing* T-shirt. You'll be the envy of all (well, some) of your friends.

Please include your first name, last name, and address, so that we can give you credit if we print your tip. (And so that we can send your T-shirt to you, of course.) Please limit your tip to 200 words or fewer. Not all tips received will be printed, and tips may be edited for length and clarity.



Use The eBay Shipping Calculator

As you are creating your eBay auction listing, pay attention to step four on the Sell Your Item form: Payment And Shipping. That's where you lay out the terms of the shipping fees for your auction. You can specify a flat-rate for shipping or have the shipping costs calculated automatically, based on the weight of the package and the buyer's address. If you don't enter any information into this section, you and the buyer will have to hash out shipping costs after the auction. To avoid unpleasant surprises, it is usually better to establish these costs beforehand.

When you use either flat-rate or calculated shipping, the shipping cost will be included in the invoicing and checkout process once the auction is over. So you're likely to get paid faster and with the correct amount. Whether you opt for flat-rate or calculated, you can list three shipping options for domestic buyers plus three for international buyers. If you offer more than one option, the buyer will get to choose one when the auction has ended. You might offer a cheaper but slower option, such as U.S. Postal Service Parcel Post, as well as a speedier, more expensive shipping method, such as U.S. Postal Service Priority Mail.

Although it can be important to give the buyer several choices (especially for heavier items that can be more expensive to ship), it is also important to make shipping convenient for you. If the lines at your local post office are always unbearably long, then don't make that an option. Instead, you might use UPS, which can pick up the package at your door.

Ronald D., Ocala, Fla.

Tabbed Browsing Made Easy

I just read the "Just Browsing" article (April 2007) and wanted to share a tip about tabbed browsing in Firefox (or Internet Explorer, for that matter). You wrote that you preferred to deal with second—or third—browser windows because they responded to the ALT-TAB toggle command. Tabs in either browser can be easily toggled with the CTRL-TAB command. As an avid Firefox user and tabbed browsing fan, I find the quick keystrokes much easier than a reach for the mouse . . . and my Taskbar stays free of multiple browser windows.

Christopher B., Harbor Springs, Mich.

Identify Those Thumb Drives

If you're like me, you will find yourself with more than one thumb drive installed. The ease of using right-click, Send To "Removable Disk" for a file is one of a thumb drive's many benefits. However, remembering what drive letter has been assigned to which drive is aggravating. To eliminate this, I change the volume label of the drive. Locate the drive in Windows Explorer, right-click it, and select Properties. On the General tab, the default name will be highlighted in the text box. Simply type whatever you wish and click Apply and then OK. The label you applied will remain until you change it. It will now always show in Windows Explorer, in the Send To menu, and on other computers. You can also just rename the thumb drive by right-clicking the drive in Windows Explorer and selecting Rename, but you are more limited as to the number of characters you can use. The volume label is not affected by formatting when you clean the drive.

Robert C., Highland, Calif.

Affordable Printing: Hope Or Hype?

Changes In The Cost Of Printing



No one likes to pay the exorbitant prices for brand-name ink and toner cartridges, but many consumers also don't want to risk using third-party cartridges or refill services, which have been linked (rightly or wrongly) with poor print quality and damage to printers. Fortunately, you may no longer need to choose between quality and quantity in your printer consumables.

Several leading printer vendors now offer low-cost or high-yield cartridges that provide consumers with cost-efficient printer consumables. In addition, many printer manufacturers have adopted an international standard to test the yield of ink and toner cartridges. In this article, we detail how you can utilize the yield data to save on printing costs and determine whether the low-cost and high-yield cartridges offer more than hype to consumers.

The Price Of Printing

Until recently, it was nearly impossible to compare the cost of ownership for different printers because ink and

toner cartridges often did not list an estimated page yield (the total number of pages that can be printed from ink and toner cartridges). Even if a page yield was listed, each manufacturer used a different testing standard, such as 5% coverage, 15% coverage, or number of 4 x 6 photos. Therefore, you couldn't make an apples-to-apples comparison of printing costs.

In December 2006, the ISO (International Organization for Standardization), in conjunction with many of the major printer vendors (including Canon, Dell, Epson, Kodak, Lexmark, Oki Data, HP, Ricoh, and Xerox, among others), approved uniform standards for measuring the estimated yield of both ink and color toner cartridges. Based on the listed cartridge yield and how much you print, you can now estimate and compare the ink or toner costs for different printers. To help demonstrate, our "Per-Page Costs" chart breaks down the "hidden" cost of ink and toner for a number of different inkjet, monochrome laser, and color laser printers that were available at press time. Because the ISO standards are fairly new, note that consumables for printers made before December 2006 may not feature an ISO yield estimate, and not all printer vendors have adopted the ISO testing procedures.

The ISO 24711 (for inkjet printers) and ISO 19798 (for color laser printers) test methodologies require a manufacturer to continuously print five test pages that are a mix of black text and color graphics—similar to the assortment of material most people print—

until the printer indicates the cartridge is empty or the printer stops printing. In addition, a manufacturer must use a minimum of nine test cartridges and three different printers. Monochrome lasers use the ISO 19752 standard, which features a similar testing procedure but replaces the five color test pages with a single monochrome document. Because photos require significantly more ink or toner than documents with text, the ISO is currently working on separate testing standards for 4 x 6 and 5 x 7 photos.

Price Wars: A New Hope

Traditionally, printer manufacturers have sold printers at or below cost to lock you into buying expensive replacement cartridges. Earlier this year, Kodak surprised many people when it launched a line of EasyShare AIO (all-in-one) printers that use affordable, high-yield ink cartridges, priced at \$9.99 for a black ink cartridge and \$14.99 for a five-color ink cartridge. Steve Billow, writing systems development manager for inkjet systems at Kodak, says, "Our research indicated that consumers were limiting what they print because of the expensive cost for ink and supplies, so one of Kodak's primary goals was to offer low-cost cartridges that produce a lot of prints." Kodak even claims that the AIO printers allow consumers to print the same number of pages at half the cost of other consumer inkjet printers.

Based on the ISO 24711 standard, the estimated ink cost for Kodak's EasyShare AIO printers is 2.3 cents for each monochrome page and 6.8 cents per color page. Compared to the other inkjet printers in our "Per-Page Costs" chart, Kodak's ink cartridges do indeed provide a cheaper cost-per-print, but depending on the printer, the Kodak AIO printers may not cut your printing costs in half. For instance, the ink cost per page of the HP Deskjet D4260 is 4 cents per monochrome and 6.7 cents per color page when used with HP's XL (high-yield) cartridges.

George Brasher, director of inkjet supplies for HP, says, "The XL options provide approximately 30 to 45% savings on a cost-per-page basis." HP also helps consumers differentiate among the ink cartridge types by color coding the various options: Standard cartridges are blue, XL cartridges are green, and specialty cartridges (highest-quality) are red. We found that Lexmark and Dell have also added high-yield ink and toner cartridge options in the last year.

Improving Ink Efficiency

More and more printer vendors are offering printers that use individual ink tank systems, rather than a single-color cartridge that contains three to five colors. With a multicolor ink cartridge, the printer may indicate the cartridge is empty after only one color runs out, and you may waste the ink left in the other tanks. In fact, a recent study by TUV Rheinland estimates that, on average, multi-ink systems used less than 60% of the ink before that cartridge had to be replaced; individual ink tank systems used 82% of the ink in the cartridge. As such, the efficiency of your ink cartridges may significantly impact your printing costs.

A Thrifty Future

Although the cost-efficient cartridge options and ISO yield standards have yet to cause a low price shift for the entire printer industry, the future looks bright for home printing. Those looking to reduce printing costs should be able to find a printer that suits their needs and offers cost-efficient cartridge options. ■

BY NATHAN LAKE

Per-Page Costs

Because the cost of replacement cartridges can quickly add up to more than the cost of the printer, the cost-efficiency, or cost per print, of a printer is an important factor. The following chart uses the manufacturer's listed ISO standard yields to determine the estimated ink or toner cost for every page you print. If the manufacturer offered multiple cartridge options, the more cost-efficient cartridge is listed. ■

| Printer | Cost Of Printer | Cost Of Replacement Ink/Toner Cartridge | Estimated Number Of Prints From Cartridge | Estimated Ink/Toner Cost Per Page | Estimated Yearly Cost Of Ink/Toner At 10ppw (pages per week) |
|---------|-----------------|---|---|-----------------------------------|--|
|---------|-----------------|---|---|-----------------------------------|--|

Inkjet Printers

| Cost Per Page Of Black Ink Cartridge Based On ISO 24711 Standard Yield Test | Cost Of Black Ink Cartridge |
|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| HP Deskjet D2430 | \$39.99 | \$14.99 | 150 | \$0.100 | \$52 |
| HP Deskjet D4260 | \$69.99 | \$29.99 | 750 | \$0.040 | \$20.80 |
| Lexmark Z1300 | \$26.99 | \$24.99 | 500 | \$0.050 | \$26 |
| Lexmark Z845 | \$49.99 | \$24.99 | 500 | \$0.050 | \$26 |
| Canon PIXMA iP1800 | \$49.99 | \$19.99 | 355 | \$0.056 | \$29.12 |
| Canon MP180 | \$99.99 | \$29.99 | 545 | \$0.055 | \$28.60 |
| Epson Stylus C88+ | \$79.99 | \$18.99 | 400 | \$0.047 | \$24.44 |
| Epson Stylus CX6000 | \$99 | \$19.99 | 370 | \$0.054 | \$28.08 |
| Kodak EasyShare 5300 | \$199.99 | \$9.99 | 442 | \$0.023 | \$11.96 |

Inkjet Printers

| Cost Per Page For Color Ink Based On ISO 24711 Standard Yield Test | Cost Of Color Cartridge |
|--|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| HP Deskjet D2430 | \$39.99 | \$17.99 | 140 | \$0.129 | \$67.08 |
| HP Deskjet D4260 | \$69.99 | \$34.99 | 520 | \$0.067 | \$34.84 |
| Lexmark Z1300 | \$26.99 | \$29.99 | 500 | \$0.060 | \$31.20 |
| Lexmark Z845 | \$49.99 | \$29.99 | 475 | \$0.063 | \$32.76 |
| Canon PIXMA iP1800 | \$49.99 | \$24.99 | 308 | \$0.081 | \$42.12 |
| Canon MP180 | \$99.99 | \$34.99 | 560 | \$0.062 | \$32.24 |
| Epson Stylus C88+ | \$79.99 | \$37.10 | 600 | \$0.062 | \$32.24 |
| Epson Stylus CX6000 | \$99 | \$37.04 | 350 | \$0.106 | \$55.12 |
| Kodak EasyShare 5300 | \$199.99 | \$14.99 | 219 | \$0.068 | \$35.36 |

Monochrome Laser Printers

| Cost Per Page For Black Toner Cartridge Based On ISO 19752 Standard Yield Test | Cost Of Black Toner Cartridge |
|--|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| HP LaserJet 1020 | \$179.99 | \$69.99 | 2,000 | \$0.035 | \$18.20 |
| HP LaserJet P2015 | \$349.99 | \$147.99 | 7,000 | \$0.021 | \$10.92 |
| Lexmark E120n | \$149 | \$86.75 | 2,000 | \$0.043 | \$22.36 |
| Lexmark E250dn | \$249 | \$120.50 | 3,500 | \$0.034 | \$17.68 |
| Dell Laser Printer 1720 | \$199 | \$129.99 | 6,000 | \$0.022 | \$11.44 |
| Oki Data B4250 | \$229.99 | \$35.90 | 3,000 | \$0.012 | \$6.24 |
| Xerox Phaser 3124 | \$179 | \$89 | 3,000 | \$0.030 | \$15.60 |
| Xerox Phaser 3150 | \$349 | \$114.99 | 5,000 | \$0.023 | \$11.96 |

Color Laser Printers

| Cost Per Page For Color Toner Cartridges Based On ISO 19798 Standard Yield Test | Combined Cost Of Cyan, Magenta, Yellow & Black Toner Cartridges | Combined Cost Of Cyan, Magenta, Yellow & Black Toner Cartridges | Combined Cost Of Cyan, Magenta, Yellow & Black Toner Cartridges | Combined Cost Of Cyan, Magenta, Yellow & Black Toner Cartridges | Combined Cost Of Cyan, Magenta, Yellow & Black Toner Cartridges |
|---|---|---|---|---|---|
| Lexmark C500n | \$349 | \$493.80 | 5,000 | \$0.099 | \$51.48 |
| Samsung CLP-300 | \$299.99 | \$211.99 | 1,000 | \$0.212 | \$110.24 |
| HP Color LaserJet 1600 | \$299.99 | \$323.96 | 2,125 | \$0.152 | \$79.04 |
| Dell 3110cn | \$449 | \$754.96 | 8,000 | \$0.094 | \$48.88 |
| Xerox 6110/B | \$299 | \$206 | 1,250 | \$0.165 | \$85.80 |
| Oki Data C3400n | \$399.99 | \$369.96 | 2,125 | \$0.174 | \$90.48 |

Rolling With A Caddy

Install A Mobile Hard Drive Rack

As our dependence on digital data has grown, so has the demand for devices that help us move and share our data. Users who need to transport files from point A to point B can send them by email, burn them to a recordable disc, pack them on a flash drive, or—if they own mobile drive racks—simply take their hard drives with them wherever they go.

Data On The Go

Also referred to as a hard drive drawer or hard drive caddy, a mobile drive rack is a mechanism that allows you to take your hard drive with you when moving from one PC to another. A typical rack consists of two parts: a frame and a caddy. The frame, which fits inside an available drive bay, functions as a cradle for the caddy and remains permanently attached to the PC. It contains receptacles for the drive's data cable and power supply. It also should have a built-in fan to cool the hard drive while it is in use. The caddy is typically made up of a plastic and metal sleeve that envelopes the hard drive and protects it during transport. It usually has its own handle for portability and a locking mechanism for securing the caddy in the frame.

A mobile rack offers several distinct benefits, the first of which is the convenience of having a hard drive that can go anywhere. Hard drives have significantly larger storage capacities than any other common storage mechanism, including recordable DVDs and USB flash drives. Being able to port around a hard drive means you can carry all of your business files, financial records, songs, photos,

Internet bookmarks, games, programs, and even your operating system, without leaving anything behind.

Another benefit of mobile racks is versatility. A single rack can accommodate multiple users and multiple hard drives. No need to dual-boot your system or set up unique user accounts; just swap out one hard drive for another.

A third benefit is performance. A drive that plugs into a mobile rack delivers data to the system faster than an external USB drive can. (An internally mounted drive that connects directly to the motherboard is fastest of all.)

Finally, mobile racks provide an added layer of data security. By removing a drive from the system, you protect it from malware, hackers, snoopy co-workers, natural disasters, and anything else that threatens the integrity of a computer. It's the digital equivalent of taking all valuables out of your car when parking it at night.

Of course, toting around a hard drive poses its own security risks, as well. For one thing, an internal hard drive is quite fragile. It can and likely will suffer permanent damage if dropped, shaken

excessively, exposed to water or smoke, or otherwise mishandled. A caddied drive is also much smaller than a desktop computer system, and so it is more likely to be mislaid or stolen.

Another drawback is accessibility. If you want to use your hard drive with multiple systems, you will need to install mobile racks on multiple systems. Actually, you will need to install the same mobile racks on those systems; caddies are not universally interchangeable among brands and models. It's also important that you purchase a rack that supports your drive. Some racks support IDE (Integrated Drive Electronics), others support SATA (Serial Advanced Technology Attachment); some drives are 3.5 inches wide, others are 2.5 inches. Pay attention to the technical specifications when shopping for a rack so that you get one that works with your system.

Rigging The Rack

Fortunately, it's quite easy to install a mobile rack on a desktop computer. The process takes less than 20 minutes, and no software is involved. All you need is a screwdriver, a hard drive, and an available drive bay.

We recommend installing the rack in a 5.25-inch bay. Such a rack, like the Kingwin KF-91-BK (\$22.99; www. kingwin.com) we installed, can accommodate the 3.5-inch hard drives typically used in desktop computing. It is possible to find mobile racks that mount in 3.5-inch drive bays and accept the 2.5-inch drives that are normally associated with laptop computing. The desktop drives tend to offer higher storage capacities, faster throughput rates,





A drive bay cover protects the empty bay and prevents unwanted elements—dust, toys, small critters, and the like—from getting into the computer system. You must remove the cover to make room for the mobile rack.

and smaller price tags than the laptop drives, but the installation procedure is virtually the same for racks of either size. Follow these eight simple steps to install a mobile hard drive rack:

1. Back up your hard drive. Before undertaking any upgrade maneuver that involves the hard drive, you should back up all of your data files. A backup is cheap insurance against data loss.

2. Open the case. When working inside the PC's case, it's always a good idea to use an antistatic wristband—a jolt of static electricity is all it takes to damage the drive's fragile circuitry. Shut down the computer, unplug the power cord, and disconnect all cables plugged into the back of the system. Move the computer to an uncluttered surface and open its case. If your computer has removable side panels, remove both of them so that you have full access to both sides of the drive bay.

3. Prepare the drive bay. Look inside the computer and locate an available drive bay. Remove the plastic cover protecting the mouth of the drive bay. In most cases, you can remove the cover by pushing it gently outward. Slide the mobile rack into the



To remove the drive from the system, remove the screws that attach the drive to the system chassis and disconnect the data and power cables at the back of the drive.

vacant drive bay. Do not secure the frame to the bay chassis at this time.

4. Prepare the hard drive. Locate the hard drive you plan to use with the mobile rack. Remove the screws that attach the drive to the system chassis and disconnect the data and power cables at the back of the drive (do not disconnect the data cable from the motherboard). Remove the drive from the system.

(NOTE: If you purchased a new drive for use with the mobile rack, we recommend installing it internally first. Doing so allows you to verify that the drive is working properly before you install it in the caddy.)

5. Attach the cables and secure the frame. Locate the data cable that you disconnected from the hard drive and plug its free end into the SATA or IDE port on the back of the mobile rack. Next, locate an available power cable and plug it into the power port on the back of the rack. Pay attention to the shape of the power port and use a power cable with a matching connector; a 4-pin Molex connector is most common, but some SATA devices may support the 15-pin SATA power connector instead. Finally, secure the rack in the drive bay by aligning the screw holes in the side of the frame with the small holes in the bay chassis. Insert at least one screw—preferably two—in each side of the frame for a secure fit.

6. Attach the hard drive to the caddy. Lift the handle of the caddy and remove the caddy from the mobile



Secure the rack in the drive bay by aligning the screw holes in the side of the frame with the small holes in the bay chassis.

rack. Slide the hard drive into the drive caddy. Align the screw holes on the sides of the hard drive with the holes in the caddy and then insert at least two screws into each side of the caddy. Use only the screws that were shipped with the rack.

7. Insert the caddy. Slide the caddy into the mobile rack. When it is inserted fully, lower the handle to hold the caddy in place. Do not force the caddy into the rack. If you meet resistance, remove the caddy and check for obstructions inside the rack. You also should check the caddy to make sure you installed the hard drive inside it correctly. The drive should fit entirely inside the caddy.

8. Lock the caddy. If your mobile rack includes a lock, insert the key and turn it to secure the caddy in the rack. When the caddy is locked, no one can remove it from the rack.

Lock & Load

Once the caddy is locked into place, the drive will function just as if it were installed permanently in an internal bay. You can read data from the drive, write data to the drive, and even boot from the drive if it's configured as the primary master. To take the drive with you, simply unlock the caddy, lift up on the handle, and pull the caddy out of the rack. Now that's what we call mobile computing! ■

BY JEFF DODD



Living A Double Life

by Kylee Dickey
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Comparing Macs and PCs used to be like comparing apples and oranges, or . . . well, Apples and Windows. Today's Macs and PCs, however, are more compatible than ever. The days when users had to choose between platforms are long gone, and one can now use both platforms with minimal hassle. The heated (and often ugly) debate over which of the platforms is "better" is unlikely to end any time soon, but Macs and PCs really can coexist peacefully.

Living In Two Worlds

Although more people use PCs than Macs, iTunes and the iPod have helped many PC users become familiar with Apple's user interfaces and designs. And a growing number of users who have a Windows-based desktop PC at home also have a portable MacBook notebook computer. Finally, Apple's relatively recent switch from PowerPC processors to Intel processors has made the notion of dabbling in the Mac world more tempting for many formerly PC-only users.

My own experience with Apple's computers and software goes back much further. I learned how to type on my family's Apple II+ back in the early '80s. I used that computer to write my own stories with an early word processor. I played Pac-Man and Asteroid on that computer, too. More importantly, I had my first taste of programming, learning to write my own simple programs in BASIC

The author using her first computer, an Apple II+, quite a few years ago.

(Beginner's All-Purpose Symbolic Instruction Code).

Although we always had an Apple at home, as the years went by, it was unavoidable that I had more experience with PCs. Various part-time jobs required that I become familiar with Windows 3.1. Although I was very comfortable in both environments, back then, my Mac and my Windows worlds never crossed paths. The software for the two systems was not compatible, and neither were the diskette formats or most data files.

Those days are long gone, though; today, I have no trouble spending half my time in Windows and the other half in OS X. During the workday, I work almost exclusively with PCs. At home, I have both Macs and PCs. I transfer files between systems, my Macs and PCs share a network, and all of the computers even share a networked printer. My home setup is a good example of how Macs and PCs can live in harmony.

PCs, Love & Understanding

Yes, it really is possible to use and love (or at least respect) both platforms. Most people are surprised to learn that Macs and PCs have been able to share files for years. Today's Macs and PCs have tremendous compatibility, and most hardware devices



are even compatible, due in part to the widespread adoption of both USB and FireWire. Now that Macs have Intel processors, the transition to true cross-system compatibility is complete.

Software such as Apple's Boot Camp or SWsoft's Parallels Desktop will even let you run OS X and Windows on the same system. And Parallels lets you use your Mac and Windows applications side by side through a virtual environment (in which Windows runs within OS X), whereas Boot Camp is dual-boot software that lets you install both OS X and Windows and choose the OS from which to boot when you start your computer. Other dual-platform options are now available, too, such as VMware Fusion.

Because today's computer users no longer have to choose to live in an exclusively Windows or exclusively Apple world, we're adding a monthly Mac column to *Smart Computing*. Each month, I'll fill you in on the latest news from the Mac world, give my opinions, and help you sort through what Apple information is relevant to you. If you have your own thoughts or opinions about Mac hardware, software, or culture, please email me and let me know. I look forward to sharing a glimpse of the Mac world with you each month. ■

Search Engine Showdown

Which One Gives You What You Want?



The Web is ever-expanding, and obtaining fruitful results from searches becomes more challenging by the day. Furthermore, since some search engines also offer to index our local PCs to produce results, it's particularly important to know which one produces the most accurate results. Come along with us as we put the top search engines through their paces and see which one (at least in our opinion) is top dog.

How We Did It

The fairest way to perform this test, we decided, was to build an increasingly complex Boolean search string and run it through several unrelated

search engines. Boolean searches are those that use extra words, such as AND, OR, or NOT, between words to refine or expand the search parameters. Most search engines support Boolean searches, and many support the use of a plus sign (+) or minus sign (-) immediately in front of the search term (no spaces) instead of AND or NOT, respectively.

To choose our contenders, we took the top engines and excluded those that use other search engines for their results. We therefore removed AOL Search (enhanced by Google), as well as AlltheWeb and AltaVista (both powered by Yahoo! Search). That left us with four of the top search engines—Google, Yahoo!

Search, Windows Live Search, and Ask.com.

To build our Boolean string, we created an imaginary family and decided they were trying to remember the name of the movie "Air Bud," so they could purchase the DVD. We assumed that the family remembered it was about a dog and thought it was a Disney movie. (You're probably thinking our test family is pretty dense. They are; we'll call them the Denstons.)

A Turn Of Phrase

We began our query with the search phrase, Dog +Movie. We figured "Air Bud" had a reasonable shot at appearing in the results, given that there were several popular movies in the series and the dog itself received a lot of media attention. Here are our results:

Google: 95.1 million results in .13 seconds. The second result was a Tripod member's page, titled Dog Movies, that offers a listing of movies including "Air Bud." Not a bad result, but not exactly a hit. The rest of the top 10 results linked to online home videos about skateboarding dogs and numerous dog movie sites, but none to our target.

It's worth noting that the Denstons could have entered the phrase "Movies About Dogs" (including quotes to indicate to the search engine that they'd like to search for this exact phrase) in any of the search engines to generate a list of sites with directories of movies about dogs. It wouldn't have led to a direct link to "Air Bud" as we're aiming for with our hypothetical searches, but using quotes around a phrase will generally generate a very specific list of results.

Yahoo!: 64 million results in .26 seconds. This search engine produced several pages about recent movies with "dog" in the title, but not our target.

Live Search: 8.4 million results in one second (by our count). This engine also took our query literally, returned nine results for six different movies containing the word "dog," plus a link

to movie dog tricks. Not much help to the Denstons, though.

Ask.com: 10.4 million results in under four seconds (by our count). This site gave preference to movie dogs, rather than dog movies, although it returned numerous results relating to "The Shaggy Dog" movie. It did include the Tripod member page Dog Movies, ranked at No. 4. We liked that the left side of the results page offered ideas for narrowing our search but were disappointed that it didn't suggest Dog Movies (plural) as an option.

Out of curiosity, we searched these sites for Dog +Movies instead of Dog +Movie. In all cases, that phrase produced many more lists of dog movies, which would have enabled the Denstons to find their title more quickly. This illustrates how important a single letter can be when you are searching.

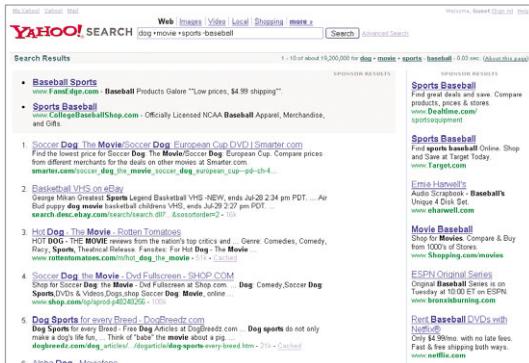
Keep in mind that when search engines “fail” to find what you’re seeking, the problem might not be the search engine, but the search parameters you’ve used. It’s not the search engine’s fault that we don’t know how to phrase a question intelligently. This is why our example search string will become more sophisticated as we proceed.

A Sporting Try

At this point in our imaginary scenario, one of the Denston children remembers that the movie was about a sport, but not baseball. So we expanded our query to Dog +Movie +Sports -Baseball, which tells search engines to exclude from the results sites that mention baseball.

Google: Google returned numerous recent dog movies again, but a page entitled My GSD Dog Sports made top ranking. (GSD is dog parlance for German Shepherd Dog.) No luck so far.

Yahoo!: This time, Yahoo! pulled up text containing our target in the second listing, returning a link



With our second search string, Yahoo! produced a result with our target in the text, but the page was not directly related to it.

entitled "Basketball VHS on eBay" that contained the text "Air Bud puppy dog movie basketball." We cannot guess whether a real-life family like the Denstons would have recognized the title and clicked, but had they done so, they would have found that the listing included a VHS tape of "Air Bud" for auction.

Yahoo! obviously determined basketball was a likely choice for a sport (other than baseball) about which there were movies. Furthermore, it probably returned that result because of the word “dog” in the “Air Bud” text. (We checked this by searching for just Movie +Basketball, and indeed, the result was not there.)

Live Search: This search veered even further away from our target than did Google, giving us more dog sports, movie dog tricks and training, links to two dog movies, and a parent's movie guide.

Ask.com: Other than returning Soccer Dog as its top offering, Ask exhibited complete confusion. It hopped all over the place, offering Magic Johnson, dog tricks, an ugliest dog contest, and several dog movies that had nothing to do with sports.

Wonderful World Of Disney

At this point, we imagined that the Denstons would despair of having their collective memory prodded, so they would add Disney

to the mix. The search string then became Dog +Movie +Sports +Disney -Baseball.

Google: Google scored this time, returning for result No. 7 "Kids Should Be High On Air Bud," a link to a review of the movie in the *Houston Chronicle*. The Denstons would still have to navigate to the DVD, though, so we didn't consider this a complete hit.

Yahoo!: Sadly, Yahoo! lost steam once we added Disney to the search string, focusing almost exclusively on "The Shaggy Dog." (Had the eBay seller from our previous result noted that "Air Bud" was a Disney movie, Yahoo! might have found it, but such was not the case.)

The excessive links to "The Shaggy Dog" were disappointing. This is a recent (2006) Disney dog movie, but it is hardly Disney's most famous movie about a dog (or two, or 101), and it has nothing to do with sports.

Live Search: Now, the focus was on movies ("The Shaggy Dog" again) and peripheral Disney offerings. However, a list of dog movies from Duck Software popped up as the third result. On that list are "Air Bud" and all its sequels, and the author of the page talks about the group, saying "The Air Bud series is a favorite in our house as my 8 year old [sic] has begun playing team sports."

It's logical that Live Search returned this result—and not some other listing of dog movies—because of that mention. The site also had ad links to the Disney DVD/VHS Movie Club. This was as close as we had gotten to a name, description, and purchase link so far.

Ask.com: Like Yahoo!, Ask.com lost all interest in sports, but this time split its focus between "The Shaggy Dog" and "Eight Below," another 2006 dog movie from Disney having nothing to do with sports. (The sled dogs in the movie work with a guide, not a racer.)

One Last Try

Since none of the search engines had directly linked us to the "Air Bud" DVD yet (although Google, Ya-hoo!, and Live Search had all come close), we went into overtime. This time, we had our Denstons add DVD to the search string. We also decided one of the Denston children had remembered the game in the movie was basketball. So our final search was for Dog +Movie +Disney +Basketball +DVD.

This time, with links to reviews, plot synopses, and Amazon.com for purchasing various "Air Bud" movies, Google nailed it. Live Search performed equally well, offering Air Bud's listing on the Internet Movie Database (imdb.com) first, followed by links to both Disney and Amazon.com for purchase.

Yahoo! performed third best, coming up with a link to buy Air Bud on eBay and several reviews and synopses of various "Air Bud" movies (no link to Amazon.com or Disney). Ask.com missed its shot completely, suggesting numerous movies (including "Basketball Diaries" and "The Shaggy Dog"—again), but didn't find "Air" on anything.

Postgame Report

It took several attempts before any of the search engines found net with "Air Bud," but then, it was a while before we gave them much to work with. Had the Denstons remembered the name of the movie, the director, or other germane criteria, they probably would have found it immediately. Of course, had they known that information, they could have run to the local movie store.

In our opinion, Google moved most consistently in the right direction, so we'd give it top honors, but just barely. Yahoo! returned a result containing our search term with the least amount of input. We placed it in second only because of disappointing results with additional



Rebooting The Internet

Is It Time To Start Over?

There are few “do-overs” in life. However, it’s not always that easy to start over. This is especially true when it comes to major undertakings. It would be difficult, for example, to imagine scrapping the U.S. highway system and replacing it with something else. The effort involved in removing the entire network of roads and replacing it with a new, albeit more efficient, system clearly isn’t worth the cost.

But several groups of respected experts think that a do-over is necessary for at least one major enterprise: the Internet. They note its security flaws, lack of support for emerging technologies, economic viability, and other factors. Still, others believe that while a complete renovation isn’t necessary, there are major aspects of the Internet that need to be overhauled.

In The Beginning

The Internet began not as a grand plan but as a simple network that has grown into a gargantuan network. The first nodes of that network were designed primarily to allow universities, research centers, and government/military organizations to share data. But when the National Science Foundation removed the ban on commercial traffic in the early ’90s, the Web became widely used around the globe by all types of users.

Because no single administrator managed the Internet, and because many users had visions for what the Internet could and should do, the Internet has become limited. This may



not seem the case, because it is a useful tool for millions of people. Look a little deeper, however, and you will see some serious issues that need to be fixed.

For example, consider the structure of the original Internet design. Guru Parulkar, the executive director of the Clean Slate Design for the Internet program at Stanford, one of the many initiatives for solving the current deficiencies of the Internet, points to limitations in the architecture of the Internet. Some of the areas that are lacking are security and robustness; control and management support; support for mobility and wireless; and economic viability, among other items. He adds that the current architecture can’t support emerging technologies, and the Internet can’t handle a new class of applications because it is based on

HTTP (Hypertext Transfer Protocol), a limited set of standards.

New Research Initiatives

The Clean Slate Design for the Internet (cleanslate.stanford.edu) is one project exploring fixes for the Internet’s current limitations. Other projects include those at Carnegie Mellon, Princeton, Rutgers, and the Massachusetts Institute of Technology.

“There’s a certain misperception that we are here to fix the Internet,” says Craig Partridge, outreach director for GENI (Global Environment for Networking Innovations) Project Office (www.geni.net), an experimental facility associated with the National Science Foundation. “We’re here to build a research facility and to test out new technologies. Our research may either be used for building a new infrastructure or for retrofitting the Internet.”

It’s not known at this point, he adds, which will happen. We’re in what Partridge calls the planning stage, where volunteers are developing GENI’s architecture and research plans. Over the next four years, Partridge says, one facet GENI will focus on is building a risk register. The risk register might include, for example, the notion of more sophisticated technology at connection points (instead of today’s technology of virtualized routers).

This is sure to be a long-term effort with many players. The Clean Slate Design program, for example, gives an anticipated timeline of looking back in 15 years in order to see significant impact from the project’s efforts. What the “new Internet” will look like in 10 or 20

years is anyone’s guess, but some of the issues we expect will be addressed are network architecture, security, economics, and policy. We may not end up with a complete do-over, but we can count on one thing—it will continue to emerge and grow after that. ■

STANFORD UNIVERSITY

Clean Slate Design for the Internet
An Interdisciplinary Research Program at Stanford University

The Clean Slate Design for the Internet program at Stanford University is just one of several initiatives designed to help fix deficiencies of the Internet.

BY HEIDI V. ANDERSON

WEB TIPS

Enhance Your Time Online

Jott It Down

Problem: I often remember things I need to do when I'm away from my computer. Even if I write it down on a scrap of paper, it's easy to lose track of these to-do tasks.

Solution: Some people who have this problem take to carrying a small micro tape recorder, but in addition to the bulk of another device to lug around, there's the often-tedious task of transcribing your verbal rambles. Enter Jott (www.jott.com), a new service. Register your cell phone and email at this site and then dial its toll-free number and speak. Jott transcribes your message and emails it to you. You can even add names from your contact book and have messages sent to their inboxes. Obviously an automated transcription won't always be perfect, but our tests in a noisy coffee shop were impressive. Your mileage may vary.

Free Business Card Maker

Problem: I would like to get personal business cards made, but I have no design skill.

Solution: One of the easiest solutions can be found at Businesscardland (www.businesscardland.com). This site has a few nice, simple templates that you can customize with your contact info. Pick a couple hues for vibrant color cards or stick with the classic black and white. The site then generates a print-ready PDF you can either send to a local print shop or print out yourself at home using your own paper stock. Very nice results for a great price—free.

Your Bookshelf Online

Problem: My local library closed down, and I don't have a place to get good book recommendations anymore.

Solution: A great place for book lovers to linger online is the new site Shelfari (www.shelfari.com). Sign up, search for your favorite books, and add them to your virtual bookshelf. The beautiful interface displays the full covers of your books. You can categorize titles into separate "shelves" such as currently reading, top ten, and wish list.

Add your friends and browse their shelves. And

How can a simple cell phone call turn into a transcribed email?
It's all about Jott.

of course, give and get recommendations of really great reads.

Tougher Passwords, Easier to Remember

Problem: I always read that I should use "hard to guess" passwords, but "hard to guess" usually means "hard to remember."

Solution: There are a number of sites that will generate a random password for you, but Strong Password Generator (strongpasswordgenerator.com) gives you a mnemonic phrase to help remember your new code. The password C|p4.Mf becomes CHINA | paris 4 . MICROSOFT firefox. Or P1Wk5T7 becomes PARIS 1 WEATHER kmart 5

TARGET 7. These might not be the most helpful phrases, but they might help make sense of a long string of randomness.

Price Protection Made Easy

Problem: When I buy stuff online there's usually some kind of price guarantee, but I don't have the time to constantly check to see if the price drops so I can request a rebate.

Solution: Don't stress the constant price checking after you buy; let the Internet do the hard work for you. PriceProtectr (www.priceprotectr.com) does just that: Enter a URL of a product you just bought from their list of 33 supported retailers (includes a bunch of the big guys such as Amazon, Best Buy, Costco, and The Gap), and this site will email you if the price is lowered within the site's allotted rebate time. PriceProtectr claims to have saved its users a total of over a cool quarter million dollars. Hopefully there's more where that came from. ■

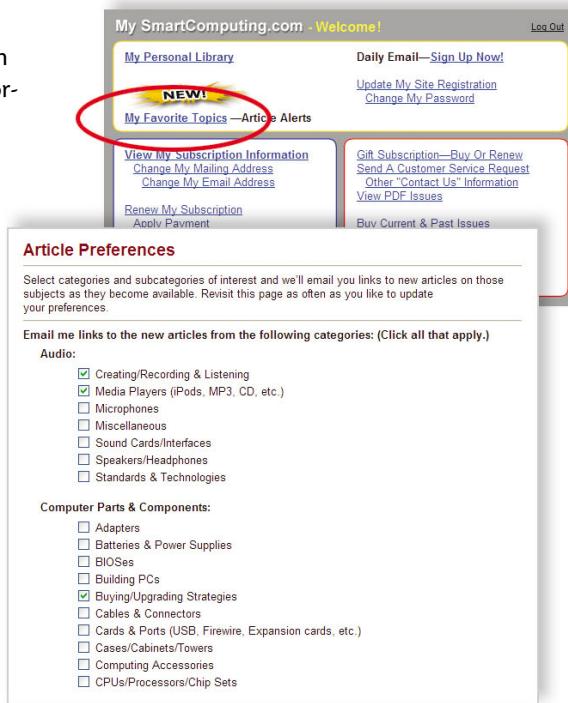


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 Batteries & Power Supplies
 BIOSes
 Building PCs
 Buying/Upgrading Strategies
 Cables & Connectors
 Cards & Ports (USB, Firewire, Expansion cards, etc.)
 Cases/Cabinets/Towers
 Computing Accessories
 CPUs/Processors/Chip Sets

From *Smart Computing's* Daily Tip Archive

Mousetrap

A major benefit of modern operating systems is that you don't need to install any drivers to operate standard components such as two-button mice. But if your mouse doesn't work upon startup, the source of the problem typically stems from the mouse being disconnected, being connected incorrectly, or requiring the installation of a proprietary driver. Besides checking your mouse connection, you can resolve many mouse problems by installing the latest drivers and software. Before you visit the manufacturer's Web site, locate the make and model of your mouse to ensure you find the appropriate driver download. You can usually find the model, product, or serial number on the bottom of the mouse, and many wireless mice include this identification on the battery cover or inside the battery compartment. If the movements of your mouse seem erratic or sticky, it's more often the result of a poor surface choice.



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Put Your Pics On The Web

iStockphoto

www.istockphoto.com

If you've ever said to yourself, "I bet I could sell this picture," here's your chance (assuming, of course, that you're talking about a photo to which you own the rights). iStockphoto sells royalty-free photos to the general public and buys photos from photographers (including amateurs). We like the Stock Photographer Training Manual, which helps new photographers submit acceptable pictures.

Flickr

www.flickr.com

Flickr offers free image-hosting accounts that let users upload up to 100MB of photos every month. The service lets you create albums for public viewing and for sharing with select visitors, such as family members. It also lets you add your pictures to photo books, calendars, postcards, and even postage stamps. Flickr has a built-in Contacts feature that lets you keep track of your favorite Flickr members, and it even lets you mark each contact as "Family" or "Friend."

National Geographic

www.nationalgeographic.com

If you share your photos online, you probably enjoy looking at other photographers' pictures, as well. Some of the most eye-popping photos we've

seen reside in *National Geographic's* online collection. The site's Photography section (the link appears on the left side of the main page) includes several featured galleries that show off pictures of deserts, walruses, and sea creatures that seem to glow in dark water. Choose a gallery or check out the Wallpapers section, which has tons of free pictures that you can put on your computer's Desktop.

Photobucket

www.photobucket.com

Although Photobucket has plenty of ads, it is very easy to use. Once you sign up for a free account (hence, the ads), you can add a picture (or multiple pictures simultaneously, if you prefer) by using a standard Windows Explorer-like browser to navigate to your computer's picture folders. You can also upload digital videos and send pictures from your mobile phone to Photobucket. And, among other perks, the site offers a free slideshow builder that lets you choose from several styles.

Riya

www.riya.com

Consider this scenario: You're sifting through the thousands of digital photos you've collected over the years, looking for pictures that include a particular person. You can run a text

search, but unless you've saved each picture file as that person's name, you won't find all of the photos—unless, that is, you store your pictures in Riya's online photo-hosting and searching service. Riya features face recognition, so once you've introduced a photo of the person for whom you're searching, the service can scour the rest of your album for photos that have that person's face.

SmugMug

www.smugmug.com

If you're tired of free image-hosting sites that display advertising, SmugMug is the way to go. The photo-hosting service charges \$39.95 per year for a standard, ad-free account. Your membership includes unlimited photo storage, photo-editing tools, and galleries that let you organize your photos by topic, to name just a few features. You can share your pictures with family and friends via your personal SmugMug Web address, and you can also share pictures with the world by making your galleries public. Check out the site's Popular Photos section, which has an ever-changing array of great pictures from other Smuggers. SmugMug offers visitors a 14-day trial and doesn't require a credit card during the trial period.

Shutterfly

www.shutterfly.com

Shutterfly offers all the features you'd expect from a good image-hosting service: It stores an unlimited number of photos and has photo-editing and sharing tools. You can remove red-eye from pictures in which your flash caught your subjects at the wrong moment, and you can choose from a variety of effects that will spice up your photos. The Shutterfly store lets you plaster your favorite pics on calendars, clothing, and other gifts. Of course, the store also lets you buy standard photo prints. You can have them shipped to you, or you can pick them up at a local Target store within an hour of placing your order.

That's News To You

Finding the appropriate Usenet discussion group to match your interests can be a monumental task. So each month, we scour tens of thousands of newsgroups and highlight ones that delve into popular topics. If your ISP (Internet service provider) doesn't carry these groups, ask it to add the groups to its list. This month, we talk shop with fellow photography enthusiasts.

rec.photo.digital

Users here discuss camera components (batteries are frequently hot topics) and help each other learn the ins and outs of photo-editing software.

rec.photo.digital.slr-systems

Digital SLR (single-lens reflex) cameras require more skill and experience than standard point-and-shoot cameras, but they provide great photos. Visit this group and ask questions or give advice about these complex cameras.

alt.photography

Whether you're experiencing problems with your camera or you're planning to buy a new one, this group is happy to answer your questions.

Share The Wares

Some of the best apples in the online orchard are the free (or free-to-try) programs available for download. Each month we feature highlights from our pickings. This month, we take a look at two easy-to-use photo-editing programs.

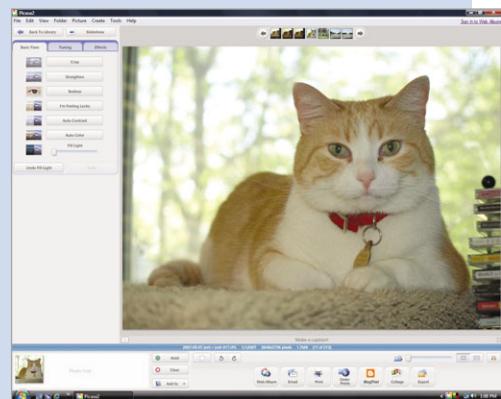
Picasa 2

picasa.google.com

Unless you're a photo-editing guru, Google's free Picasa 2 software has all the tools you need to organize and edit your digital photos. The program also helps you create a screen saver from your favorite pics and build slideshows that will impress family and friends. Picasa's companion tool, Picasa Web Albums, lets you share your photo albums on the Web if you feel so inclined, but Picasa's top priority is letting you make the most of the photos on your computer.

Once you install Picasa, the software scans your computer (or specific folders, if you prefer) for photos and then displays thumbnails of your entire digital photo collection. The program organizes your photos by their folders, making it easy to find specific pictures. We also like the built-in picture editor. Its tool palette includes a Crop feature and a Redeye remover, but we suspect you'll use the Fill Light tool most of all. When you move its slider bar, your picture will instantly brighten, exposing previously obscured details.

Picasa supports Linux and Windows 2000/XP/Vista. Picasa Web Albums supports Mac OS X 10.4 and Windows. Picasa and Picasa Web Albums are free, but you'll need to sign up for a free Google account to use Picasa Web Albums.



Have some dark pictures? Don't throw them away. Picasa's Fill Light tool saves low-light photos from the Recycle Bin by turning them into bright, vibrant pictures.

Snapfish PhotoShow Express

www.snapfish.com

Picasa 2 isn't the only free, easy-to-use photo software floating around the Web. HP's Snapfish image-hosting and printing service also lets users download PhotoShow Express. The program helps users create slideshows, Desktop backgrounds, and screen savers, among other tasks.

Users who want a more robust photo-editing program can upgrade to PhotoShow Deluxe for \$39.99. The Deluxe version lets you burn pictures to CDs that can display photos on some DVD players. It also offers unlimited slideshow sharing and provides additional clip art and music. Both PhotoShow Express and Deluxe support Windows 98/Me/2000/XP. ■

Live Life On The Edge With Mr. Modem

With Halloween rapidly approaching, if you're desperately seeking creepy Halloween ring tones—and who among us isn't—be sure to check out Monster Tones at tinyurl.com/2tmg58. Speaking of creepy, you should have seen my Cher costume last year. I was quite the high-tech hottie, if I do say so myself—in an aging, aching, cranky, bifocaled, graying kind of way. (Sorry, ghouls, I'm married.)

If you enjoy games, try Guess-the-Google (tinyurl.com/76sym) to stimulate your synapses. Twenty images are displayed that relate to a single Google search query. Your mission, should you choose to accept it, is to figure out which search term resulted in the images, and to do so within 20 seconds.

TelePixie (www.telepixie.com) is a free service that provides wake-up calls, reminders, stock prices, weather updates, and temperature alerts—in the event sticking your head outside is too much of a challenge. Because the service is free, each call you receive is accompanied by a short ad. So if your idea of a perfect morning includes being awakened by the sound of a ringing phone and listening to an advertisement, you won't want to miss this service.

If you need to send a file, there's an easier way than laboriously opening your email program, composing a message, and clicking the Attach button. Instead, right-click any file or folder, select Send To, and choose Mail Recipient. In most cases, this will open your email program and create a new message with your selected file attached. Enter your recipient's email address, click the Send button, and you're done.

I recently tested a portable storage device that's perfect for anybody in need of a safe haven for his or her precious and not-so-precious photos. Available in 40, 80, and 120GB capacities, the Photo Safe (tinyurl.com/342ohx) uses a lithium-ion battery that can be recharged by computer, USB port, AC power, or bolt of lightning. The capacity of this beast is impressive: Based on a 5MP (megapixel) photo being approximately 2.4MB in size, the 40GB model will store more than 15,000 photos; the 80GB will harbor 31,000 photos, and the 120GB will hold more than 46,000 photos. My dinky photos average 150KB each, so with the 40GB model I can save more than 240,000 photos. That should be just about right for my

"Deliverance Revisited" canoe trip down the Chattooga River this past summer. (If I never hear "Dueling Banjos" again, that will be fine.) Prices start at \$149—for the Photo Safe. My vacation photos: Priceless.

Some thrill-seekers skydive, others swim with sharks or wrestle alligators. Adrenaline junkies like me occasionally live life on the edge by circumventing the

Recycle Bin when deleting files. What a rush! If you would like to join me on the digital precipice, the next time you delete a file, hold down the SHIFT key and then press DELETE. Life will never be the same after you've stared into the binless abyss.

Surfin' Safari—As I write this, Apple has just released a beta version of its popular Safari Web browser (www.apple.com/safari) for Windows and Vista users. I can best sum up my reaction in four words: "I'm sticking with Firefox." I wish I could say that I'm just wild about SafWin, but my initial impression was the

same as it was when I saw my cousin Jasmine for the first time in 15

years at a family reunion: Unattractive as ever. On the plus side, installing Safari was fast and easy—not unlike Cousin Jasmine, I might add. If we didn't have Internet Explorer, Firefox, and Opera, Safari might be a viable alternative. But we do, so it's not.

Remember Billy Joel's 1989 classic, "We Didn't Start the Fire"? It included a plethora of rapidly spoken names and historical events, beginning with "Harry Truman, Doris Day, Red China, Johnnie Ray; South Pacific, Walter Winchell, Joe DiMaggio." The lyrics have been combined with images, plus some good-natured humor, and are available for viewing at tinyurl.com/3bbg5e. Caution: Not for individuals with musically addictive personalities. Trust me: You'll be humming it all day. ■

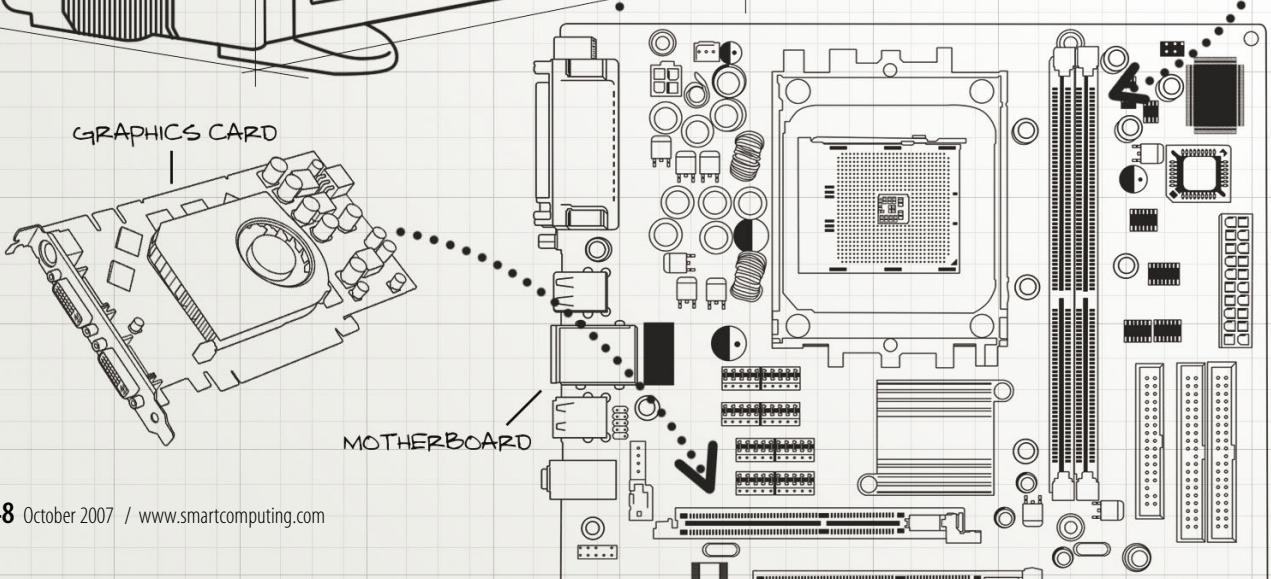
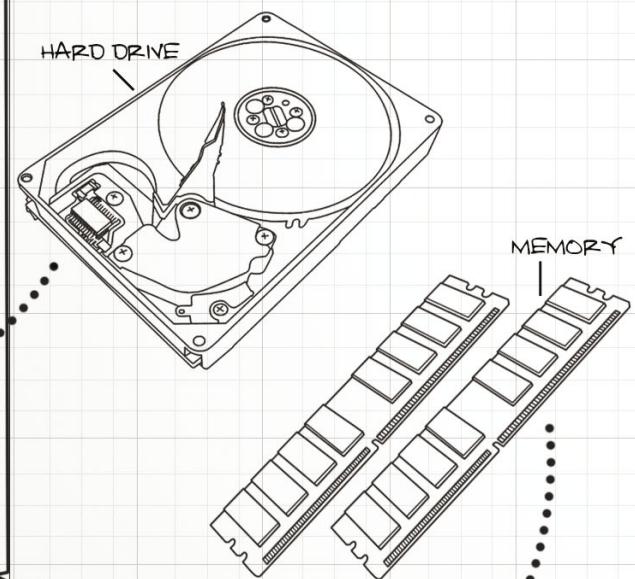
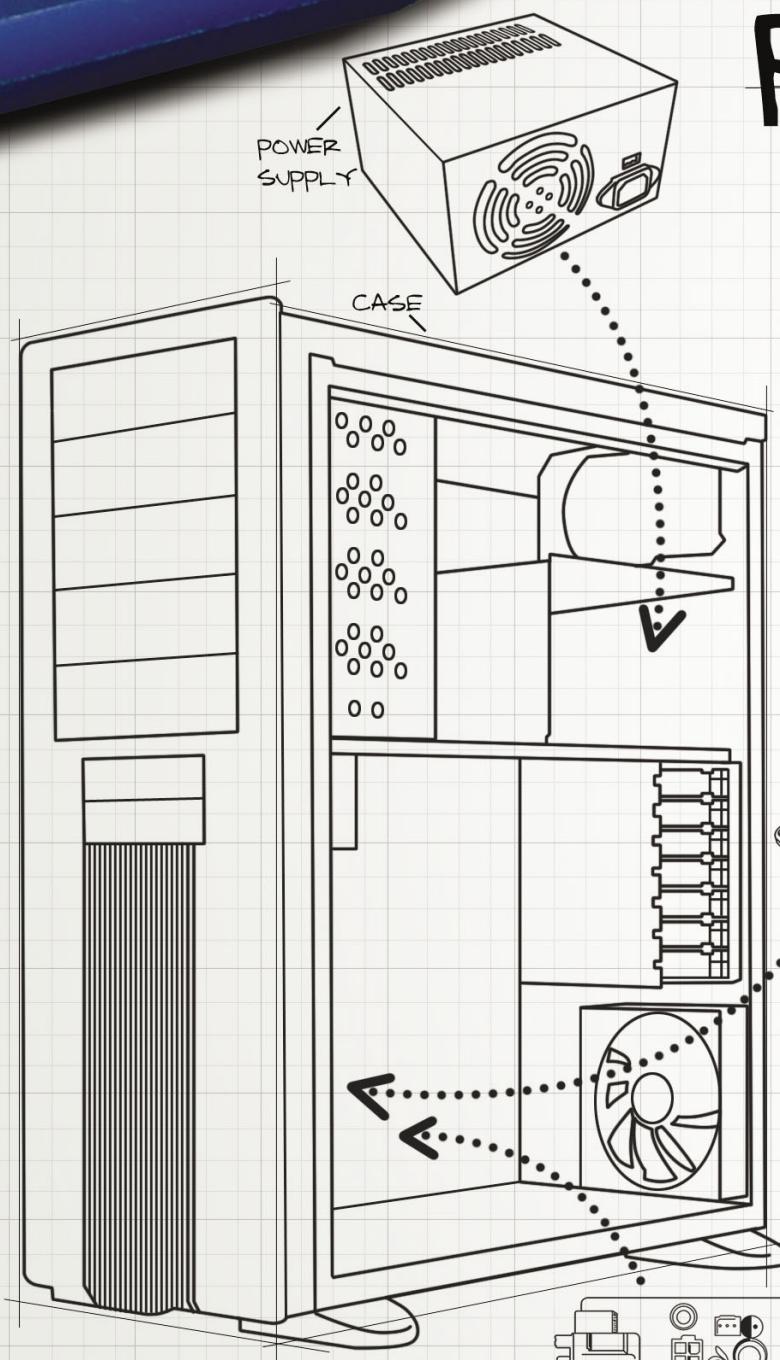
BY MR. MODEM

Mr. Modem (Richard Sherman) is an author, syndicated columnist, radio host, and publisher. "Mr. Modem's Weekly Newsletter" provides personal responses to subscribers' computer and Internet questions, plus weekly computing tips, Web site recommendations, virus alerts, hoax warnings, and more. For additional information, visit www.MrModem.com.



BUILD THE PERFECT BEAST

ASSEMBLE
YOUR OWN PC



Understanding how all the pieces fit together and knowing where each part comes from and what it does is of tremendous benefit when troubleshooting and tweaking.

Building your own computer has long been the mark of a true hobbyist. In days past, it was also the mark of someone on a budget.

Saving money by buying parts and building a computer, however, is a thing of the past. You probably have half a dozen nearby retailers (and hundreds of reputable e-tailers) to choose among. Commoditization and economies of scale have made most bargain and midlevel retail PCs cheaper than anything a hobbyist can build.

So why build your own PC, then? Experience is one main reason. Understanding how all the pieces fit together and knowing where each part comes from and what it does is of tremendous benefit when troubleshooting and tweaking. Having manuals and specifications for each part and understanding how to replace each one will also come in handy when upgrading.

The other main benefit to building a system is being able to choose exactly what goes into it, focusing budget and computing power on the areas most important to your needs. For example, a gamer would likely spend extra on memory and a screaming graphics card in exchange for a cheap keyboard and printer (and forgoing expensive office software). On the other hand, a writer who couldn't care less about video games might save money with onboard video and audio while splurging on an ergonomic keyboard and a fast laser printer.

If You Build It...

Building a computer is simpler than you might think.

Acquire the parts, read the documentation, install the core

components, install the OS (operating system) and other basic software, and finish with peripherals. In this month's feature package, we'll walk you through the main hardware categories to consider when building your own PC and then finish with step-by-step directions for putting it all together.

Guts and glory. The motherboard, memory, and CPU are the brains of the outfit and are essential to setting the tone for the whole system. Don't skimp here—these parts of the system are crucial. Our system has plenty of memory (2GB), a fast processor, and a versatile motherboard from Asus. The processor and motherboard are typically the



Gathering the right components and putting them together helps build valuable experience and lets you customize the system to your needs.

hardest components to upgrade, as well, so future-proofing these areas of the PC is important. We'll show you how to get started in "Pick Your PC's Primary Parts" on page 51.

Sound and sight. Video and sound needs are highly variable, depending on how you plan to use the system.

51 PICK YOUR PC'S PRIMARY PARTS THE MOTHERBOARD, MEMORY & CPU

54 WATCH & LISTEN GRAPHICS & AUDIO HARDWARE

58 A PLACE FOR EVERYTHING HARD DRIVES & OTHER STORAGE OPTIONS

61 GIVE IT A HOME & GIVE IT SOME POWER THE CASE & POWER SUPPLY

63 SOME ASSEMBLY REQUIRED PUTTING IT ALL TOGETHER

SmartComputing.com's Tech Support Center is a valuable tool for finding information and assistance on home-build systems.

They may be the most expensive parts of the system, or they may be a near-afterthought built into the motherboard. In "Watch & Listen" on page 54, we discuss on-board options but highlight mid-to-upper-level video cards from Nvidia and AMD, plus a Creative Sound Blaster with multichannel (surround sound) audio capabilities.

Hard drives and beyond. Storage has undergone one of the quietest revolutions in computing. As dramatic as Moore's Law has been, it's nothing compared to the growth in storage capacity in recent decades. When building your own PC, shop for a large internal hard drive and consider adding an external drive for backups

and portable storage. We take a look at hard drives and other storage options in "A Place For Everything" beginning on page 58.

Power house. Computer cases and power supplies are often overlooked. How many ports a case offers, where they're located, and the power a system can draw are all important considerations in building your own PC. See what we recommend in "Give It A

The homepage of Smart Computing features a large banner at the top with the site's name. Below the banner, there are several sections of content and links. On the left, there's a "Get Computer Expert Help" section with a "Ask Any Computer Related Question & Find The Answer ASAP. Try It Now!" link to JustAnswer.com. In the center, there are links for "Antivirus Free Downloads" (Free Antivirus, Spyware and Registry Cleaners), "Windows Xp Virus" (Stay protected against viruses & spyware at GeekSquad.com Anytime), and "Rebooting Problems?" (Try Qresolve's Tech Support Free Trial. Call Now: 1-888-977-3765). On the right, there's a sidebar titled "Tech Support Center" with links to various support articles and tools. A "Search The Tech Support Center" input field is also present. The overall layout is clean and organized, designed to help users find the information they need for their computer builds.

Alone In The Wilderness?

After building a computer, you may feel on your own when it comes to tech support and maintenance. The lack of dedicated support resources can be daunting, but a few public resources will go a long way. You may even end up solving problems faster without spending hours on hold.

We call it "Smart" for a reason. *Smart Computing*'s Web site, message boards, and various magazines and sister publications provide ongoing education and specific troubleshooting assistance in your hour of need. Search past articles at www.smartcomputing.com to find issues similar to yours, or ask specific questions on our Q&A Board and in our Computing Chat Rooms.

Google's wonderful search tools and great discussion groups can provide quick answers to almost any question. Search www.google.com for a specific error message or hardware model, and you'll probably uncover the same issue with a solution.

Almost all manufacturers provide help and support resources on their Web sites. And, because you built the computer, you know exactly where each part came from. ■

Home & Give It Some Power" on page 61.

Put It Together

Of course, the pieces on their own are about as useful as a garage filled with standalone Ferrari parts—understanding how to put them together is essential. We'll finish up by walking through the assembly process (refer to "Some Assembly Required" on page 63) from start to finish.

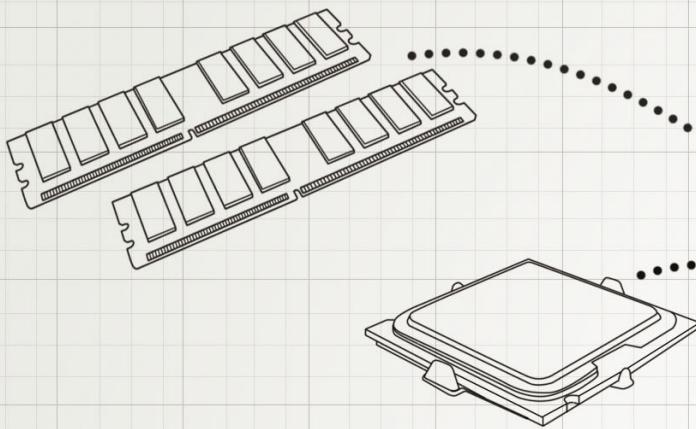
Building your own computer can be a rewarding and instructive experience. Once completed, the system will meet your needs precisely, and you'll better understand the machine's inner workings. That's an accomplishment in itself. ■

BY GREGORY ANDERSON



www.google.com

www.smartcomputing.com



PICK YOUR PC'S PRIMARY PARTS

THE MOTHERBOARD, MEMORY & CPU

If you're buying PC parts for the first time, you're probably a little nervous about choosing a processor, memory, and a motherboard. After all, they're some of the most important components in your PC. They play a huge role in your computer's performance and control your PC's other parts. And, of course, there are compatibility issues. Certain CPUs are compatible with certain motherboards, which, in turn, are compatible with specific types of memory. Buy an incompatible component, and your PC will be a paperweight while you exchange the component for an appropriate part.

That said, tracking down the right components won't be a bear—if you know what to look for. We'll help you understand how the components work, and we'll dish up plenty of shopping tips so you can make informed decisions at your local (or online) electronics store.

Anatomy Of A PC

Before you start shopping, we'll take you on a brief tour through your PC's guts. The more you know about how the CPU, memory, and motherboard relate to each other, the better

prepared you'll be to find the best components for your computer. As you read this article, keep your computer's purpose in mind. Power and speed aren't as important in a home use machine that will spend most days surfing the Internet as they are in a heavy-duty computer used for gaming or graphically intensive work.



Handle your processor and motherboard carefully. AMD processors have hundreds of fragile pins. Many new Intel processors lack these pins, but motherboards for Intel processors have them.

CPU. People often refer to the processor as the "brains" of the computer because it bears the bulk of the PC's calculations. The processor interprets instructions from you (via software, such as Microsoft's Windows operating system and any other software you've loaded onto the

computer) and then passes on the instructions to the other components in the PC. Although the CPU is a complex device and several factors affect its performance, you'll want to focus on two critical features when shopping: the processor's **clock speed** (the speed at which it performs calculations) and its number of cores.

The labels on processor packages and online electronics retailers keep the processor speed front and center, so you won't have any trouble finding this info when shopping. The processor speed is measured in gigahertz, which appears as GHz on most labels. Thus, a processor's clock speed will likely appear as 2.13GHz or something similar.

These days, many processors also have more than one processor core. Each core acts as a separate processor, which makes multicore processors better able to handle simultaneous tasks than single-core processors. A single-core processor is a good choice for a PC that handles basic household tasks, such as word processing and Internet surfing, but if you edit home videos while you surf the Internet, you'll find that a dual-core processor keeps your computer running smoothly.

Memory. System memory also impacts your computer's performance. Your hard drive stores all of your PC's data permanently, but when you open a program, that application's information transfers to the memory so your processor can access it quickly. Like a hard drive, memory stores data, but memory can transfer that data to and from the processor much faster than a hard drive can. That's why your system's memory capacity is so important: The more system memory you have, the more data your computer can make readily available to the CPU.

Motherboard. Your motherboard is the hub of activity in your computer. Almost all of your PC's components connect to the motherboard in one way or another, and the motherboard routes data among the PC's components. The motherboard includes a socket for your CPU and slots that hold your memory. You'll also find several clusters of pins that stand along the bottom end of your motherboard. You can attach your new case's front panel USB and LED (light-emitting diode) ports to these pins via the cables you'll find in your case (your motherboard's manual should offer instructions for attaching the pins).

The motherboard also includes several ports that are designed to be accessible from the back of your PC. These ports, known as I/O (input/output) ports, let you connect your mouse, keyboard, and any USB devices to your

computer. Most modern motherboards also have an Ethernet port in this area.

Choose Your Weapon

You can shop for components in any order you'd like, but keep in mind that, once you've selected a motherboard, you're limited to the type of processor that the motherboard supports. Because the processor is so critical, we generally choose the processor before choosing a motherboard; the motherboard's specifications will then help us determine what type of memory to buy.

CPU. Unlike the motherboard industry, in which several manufacturers offer products, only two major companies offer CPUs for standard computers: AMD and Intel. Both manufacturers have quality processor lines, so we don't recommend one brand over the other. Regardless of the brand you choose, we recommend that you consider a dual-core processor, as you'll be able to run more applications simultaneously with less impact on the performance of your computer. AMD CPUs that have dual-core processors feature the "X2" tag in their names; dual-core Intel processors are known as Core 2 Duo CPUs.

Be sure to note your processor's socket type, as you'll need to buy a motherboard that has a compatible socket. This information is on the processor packaging and in online retailer descriptions. At press time, many

AMD CPUs are socket AM2 processors; most Intel CPUs on the market are socket LGA 775 processors.

You won't have any trouble finding a CPU that meets Windows Vista's minimum requirements—the operating system can get by on an 800MHz processor. However, Microsoft recommends that users buy a 1GHz or faster CPU to get a better experience from Vista. Nearly all of the CPUs you'll find for sale today are faster than 1GHz (many processors run at speeds faster than 2GHz). Processors range in price from under \$100 to more than \$1,400.

Motherboard. Once you choose a processor, you're ready to find a motherboard. The most important feature is the motherboard's socket, which you'll need to match to the processor. For example, if you selected the socket AM2-based 2.8GHz AMD Athlon 64 X2 5600+ processor we use in our PC (see "Some Assembly Required" on page 63), you'll need to buy a motherboard that also has an AM2 socket. In our case, we chose the Asus M2N-E motherboard (\$95; usa.asus.com), which is compatible with the 5600+.

After you find compatible motherboards, compare their features. A standard motherboard should include SATA (Serial ATA [Advanced Technology Attachment]) connectors, USB connectors, PCI (Peripheral Component Interconnect) slots, and memory slots. The board will have at least one IDE (Integrated Drive Electronics) connector, which lets you attach your optical drive (the CD/DVD drive) to the motherboard. Your new motherboard will also have a BIOS (Basic Input/Output System) chip, which stores the basic operating system that controls certain hardware features.

Most motherboards have the features we just mentioned, but be sure to check the motherboard's specifications to make sure it has other features



Install fans at the front and rear of the system chassis to create a constant flow of cool air through the system.

that you want. If you don't plan to buy a video card, for example, the M2N-E isn't a good choice, as it doesn't have integrated graphics capabilities. On the other hand, if you plan to install a video card, the M2N-E is ideal because it has a PCI-E (PCI Express) x16 slot, which supports most modern graphics cards.

Memory. Your motherboard's specifications can help you find memory that is compatible with the board. The specifications should offer four facts: the type of memory it supports, the number of slots it has for memory DIMMs (dual in-line memory

Keep It Cool

Heat is your computer's enemy. It can slow your computer and even, in extreme cases, cause damage to your PC's components. To avoid heat-related problems, you'll want to place at least three fans in your computer: an intake fan, an exhaust fan, and a CPU heatsink/fan. Some PC enthusiasts opt for watercooling and other exotic cooling methods, but those complicated setups are better-suited to over-clocked computers and experienced PC builders.

Fans. Most modern PCs have an ATX (Advanced Technology Extended)-style case, which is thin and long. You'll find screw holes (or, in some cases, a special bracket) for a fan at the bottom of the front panel and the top of the rear panel. Once you attach fans to these panels, the PC will send cool air from the room

through the front panel, force the air over the hot components, and then expel the warm air from the back of the PC.

Heatsink. If your new processor's box includes a heatsink, you probably have all the cooling you need. CPU manufacturers pair their processors with no-frills heatsinks that provide adequate cooling under normal conditions. As long as your computer has a decent airflow (via the front and rear fans we just discussed) and you haven't configured the motherboard's BIOS (Basic Input/Output System) to run the CPU faster than its default setting, this heatsink will handle your cooling needs for the life of the PC. However, default heatsink/fan combos are sometimes noisy and may not adequately

cool your processor in particularly hot, muggy climates.

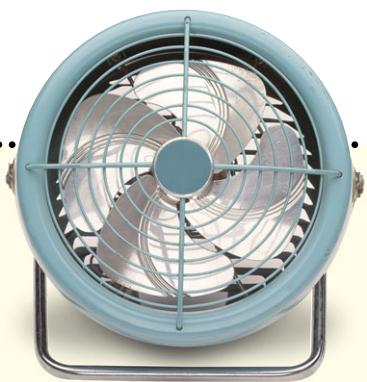
To that end, many computer parts manufacturers build heatsinks that offer better (and usually quieter) cooling than stock heatsinks. When you shop for a heatsink, consider one that has a copper body, as copper provides great heat transfer. Make sure that the heatsink is built for your motherboard's CPU socket (the Asus M2N-E has an AM2 socket, for example). You'll be able to find this information online and on the heatsink's box. The best third-party heatsinks on the market will run you as much as \$80, but you can find quality heatsinks for as low as \$30. ■

modules), the maximum capacity memory the board can support, and whether the motherboard offers a single or dual channel to the processor.

Many of today's motherboards rely on DDR2 or DDR3 memory, but some older boards require DDR (double data rate) memory, DDR2's predecessor. The memory types aren't interchangeable, so make sure your memory's type matches the motherboard requirements. Motherboard specifications

usually pair the memory type with the motherboard's maximum supported memory speed. The Asus M2N-E's DDR2-800, for example, indicates support for DDR2 memory that runs at 800MHz. For our build, we used Super Talent's T800UX2GC4 2GB kit (\$95; www.supertalent.com).

The Asus M2N-E includes four memory slots and has the popular dual-channel technology, which boosts memory performance by splitting data transfers to two pairs of slots, instead of treating all four slots as one unit. To get the best performance from a dual-channel motherboard like this, you'll want to buy two identical DIMMs instead of one. If you're planning to buy 1GB of memory, for example, choose a pair of 500MB DIMMs instead of a single 1GB DIMM. Your manual includes instructions for installing the memory.

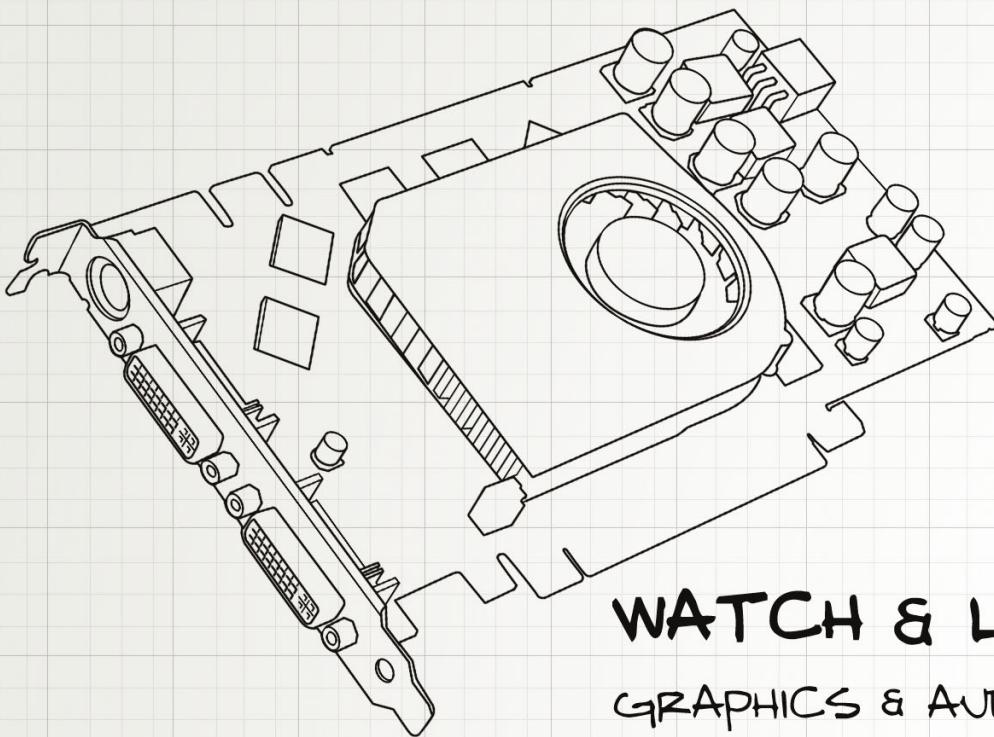


New vs. Almost-New

One thing's for certain about computer parts: They don't make them like they used to. In fact, they don't make them like they did last year or even three months ago. Manufacturers build new technology into many computer components every few months, which means you shouldn't spend a ton of money on the latest components, hoping that they'll last you a lifetime. That super-fast processor may still be considered speedy a year or two from now, but by then it will lack other technologies that newer processors have.

There is a vast sea of PC parts available that fall somewhere between best-of-the-best and too-old-to-bother-with. Consider buying these midrange parts, as they'll save money. Spotting midrange parts is easy—CPU manufacturers often use ascending model numbers to denote the latest processors. To that end, you can easily spot a midrange component, such as the AMD Athlon 64 X2 5600+, which is a better CPU than the 4800+, but not the fastest or newest CPU on the block. ■

BY JOSHUA GULICK



WATCH & LISTEN

GRAPHICS & AUDIO HARDWARE

When it comes to building your own PC, video and sound needs can vary, depending on how you use the system—they may be the most expensive parts, or they may be considered merely integrated features. But, keep in mind that your PC's graphics and audio hardware is responsible for processing everything you see and hear when using your system.

You generally have two options when choosing these components: discrete or integrated. With integrated graphics and audio adapters, the microchips responsible for what you see on your display and what you hear from your speakers are a part of the motherboard. If you are thinking of opting for integrated hardware, see the “Integrated Incorporated” sidebar for benefits and drawbacks. Alternatively, discrete graphics and audio cards are sold separately and use the PCI (Peripheral Component Interconnect), PCI-E (PCI Express), or AGP (Accelerated Graphics Port)

interface to connect to your computer's motherboard.

Sound Advice

Your audio hardware, whether it's an integrated chip or an expansion card, is designed to record, play, and process audio from the operating system, software applications, electronic musical instruments, games, movies, and other external sources. Typically, sound cards and motherboards include three or more colored ports for connecting speakers and other devices. In most situations, the pink port is the analog audio input for an external microphone; the light

blue port is the analog audio input, and the lime green port outputs analog audio for devices such as stereo speakers or headphones. Other colored ports you may encounter include orange, black, and gray. These ports are typically audio outputs for the side speakers, subwoofer, center channel, and rear speakers of multi-channel surround-sound systems. High-end sound cards often include one or more digital audio inputs and outputs.

Some sound cards and motherboards feature jack sensing technology, which lets the PC determine the type of device connected. In a few cases, the software has jack retasking capabilities that reassign the port to accommodate the connected device, even if you plugged it in to the wrong port. Intel's integrated High Definition Audio has this capability. Even if jack retasking is not available, audio software with jack sensing capabilities



This graphics card uses the dated AGP (Accelerated Graphics Port) slot.

will typically display an alert message that directs you to the proper port for the device you're trying to connect. Some sound cards also have a port that can act as either an input or an output for multiple types of devices. In Creative Labs' products, for example, this is called a FlexiJack.

Although purchasing a sound card is optional in most cases, the improvement you'll experience compared to the sound chip on your motherboard is literally audible. But choosing the card that's right for you may not be so simple. Depending on the features you want, you can spend anywhere between \$20 and \$300.

Leisurely listener. If you're looking for an ear-pleasing sound card that won't break the bank, we recommend Creative Labs' Sound Blaster Audigy SE (\$29.99; www.creative.com). This sound card plugs into a PCI slot on your motherboard and supports 7.1 surround-sound speaker systems. This unit has a **signal-to-noise ratio** (the ratio of the sound you want to hear compared to the distortion you don't want to hear) of 100dB (decibels). (Numbers over 90dB are generally good at reproducing sound as it was meant to be heard.)

Serious about sound. If you are a media enthusiast, audiophile, or PC gamer, then your motherboard's onboard audio just won't do. To get the most performance for your dollar, check out the Creative Sound Blaster X-Fi XtremeGamer (\$99.99; www.creative.com). Like the Audigy SE, this card can accommodate up to 7.1-channel surround-sound speakers. The Sound Blaster X-Fi XtremeGamer has an impressive 109dB signal-to-noise ratio to bring an even more true-to-life sound to your music and PC audio. This card also supports EAX (Environmental Audio Extensions) Advanced HD (high-definition) technology, which reproduces realistic environmental audio effects in PC games.

If you are a media enthusiast, audiophile, or PC gamer, then your motherboard's onboard audio just won't do.



This graphics card uses a PCI Express interface.

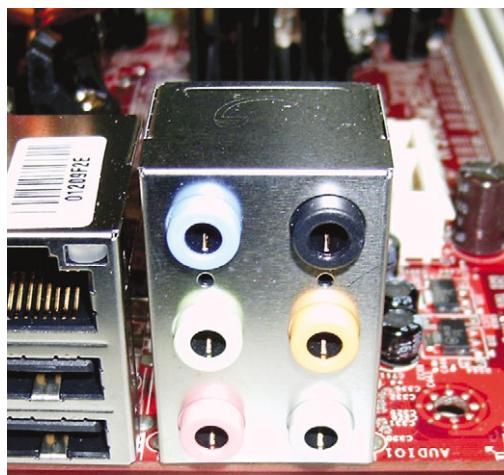
Graphic Details

Your graphics adapter is responsible for everything you see on your monitor, be it the operating system, applications' interfaces, documents, games, or the Web via your browser. Most modern graphics cards plug into your motherboard's PCI-E slot. Older graphics cards use AGP or PCI slots. The back of the graphics card (or motherboard with integrated graphics) will have one or more display output ports. The white DVI

(Digital Visual Interface) ports transmit uncompressed digital video signals to your monitor. The blue 9-pin ports are called VGA (Video Graphics Array) ports and transmit analog video signals to your monitor. Most new graphics cards (and monitors, for that matter) favor DVI over VGA, but some graphics cards offer both interfaces. Many graphics cards offer DVI-I ports, which let you connect either digital or analog monitors with an adapter. If you're not purchasing a new monitor, make sure

you purchase a graphics card that supports the old monitor's interface type.

Because graphics technology changes so often, try to purchase the most up-to-date hardware you can afford. For instance, opt for PCI-E cards over AGP or PCI, make sure the card has at least one DVI port, and make sure it will run with current applications, as well as those just on the horizon. Nvidia and AMD recently launched their latest round of cards designed to meet the graphically demanding specs of Windows Vista. The GeForce 8 Series graphics cards from Nvidia and the Radeon HD 2000 Series graphics cards from



The motherboard's onboard sound adapter can accommodate up to six audio I/O (input/output) devices.

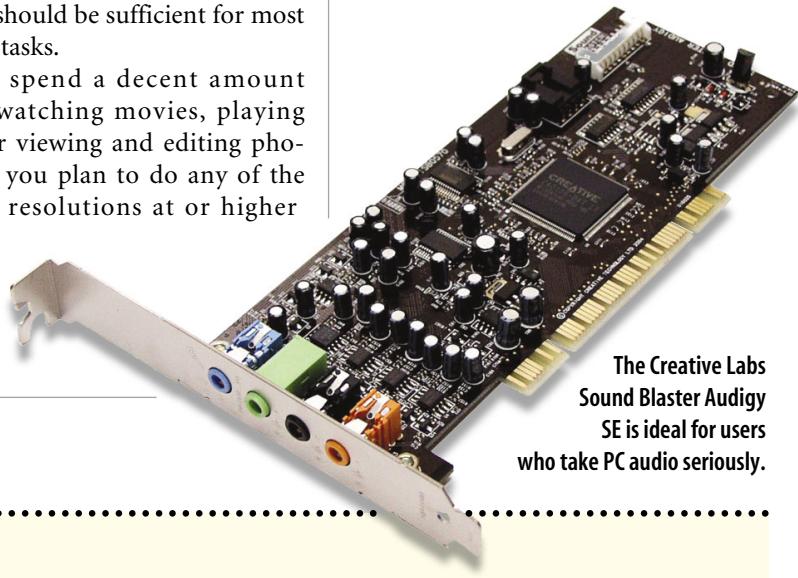
AMD both support all of Vista's visuals. Furthermore, these cards all support Microsoft's newest DirectX 10 API (application program interface; software that handles graphics and multimedia requests between applications and the operating system). DirectX 10 is built around the strengths of modern graphics cards, but you'll need a fairly high-end card to really appreciate these improvements.

For most users, any current \$100 graphics card can handle basic everyday tasks, such as spreadsheet apps, word processing software, Web browsing, email, and watching DVDs. But you shouldn't choose your graphics card based on price alone. The amount of dedicated

memory the card comes with is also a relatively useful performance indicator. Any graphics card with between 64MB and 128MB of onboard memory should be sufficient for most common tasks.

If you spend a decent amount of time watching movies, playing games, or viewing and editing photos, or if you plan to do any of the above at resolutions at or higher

than 1,600 x 1,200, then you'll probably want to spend between \$150 and \$250 on your graphics card. Graphics cards in this price



The Creative Labs Sound Blaster Audigy SE is ideal for users who take PC audio seriously.

Integrated Incorporated

Should you go discrete or integrated? That's the big question when it comes to selecting video and audio hardware for your new PC. Almost every motherboard currently available has a built-in audio controller. Some motherboards also include integrated graphics adapters. Read on for a few tips to help you decide if an integrated adapter is all it's cracked up to be.

Integrated Audio

There are a handful of advantages to forgoing a discrete sound card in favor of the integrated chip installed on your motherboard. For many users, buying redundant hardware may be impractical when you're also trying to purchase the fastest processor or most memory you can afford. Integrated audio chips also consume less energy than their standalone counterparts.

And for most users, modern integrated audio chips offer excellent audio quality and multichannel surround sound with movies, games, music, and other audio sources. If you plan to use your PC primarily for light entertainment purposes, then an integrated audio chip should be sufficient.

The downside of going the integrated route is that all of the audio processing tasks your PC has to perform are generally offloaded to the CPU, which can impact performance while you're doing other CPU-intensive tasks, such as playing games and editing video. For audio-philes, even a relatively inexpensive sound card will generally outperform an integrated sound chip in sound quality. The difference may not be much, but if you have a discerning ear, then the minimal cost of a standalone sound card is

worthwhile. Furthermore, if you're planning on using your PC primarily for gaming and multimedia purposes, then you should definitely consider a standalone sound card.

Integrated Video

Integrated video isn't nearly as readily available as integrated audio, but you shouldn't have a hard time finding motherboards that include a built-in graphics adapter. The pluses of buying a motherboard that can handle the video processing tasks for your PC are compelling. Discrete graphics cards start at about \$50 and can cost up to several hundred dollars, so opting for an integrated adapter lets you apply more of your budget toward other components, such as the CPU or system memory. And because integrated graphics are typically a feature of low-cost systems,

motherboards with integrated graphics adapters tend to be fairly inexpensive.

The major pitfall of integrated graphics is that these adapters typically rely on your system memory for their **frame buffer** (the storage area that holds graphical data just before it displays on your monitor). This can significantly impact your PC's performance if you don't have a lot of RAM to spare. ATI's HyperMemory and Nvidia's TurboCache technology refer to the graphics adapter's ability to snag a portion of your system memory for graphics purposes. Furthermore, if you have even the remotest desire to run Windows Vista with all its bells and whistles, you'll need a graphics adapter that supports DirectX 9 and has at least 128MB of graphics memory. When shopping, check the motherboard's specs for this information. ■

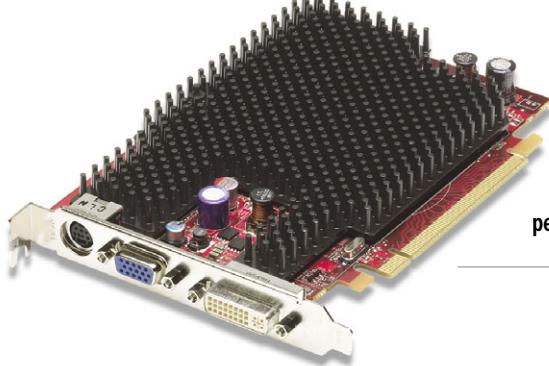
range generally have 128MB to 256MB of onboard memory, but check the specs before you make your purchase.

If you regularly use your PC for graphically intensive applications, such as games, video-editing suites, or 3D modeling software, then expect to spend in excess of \$400 on your graphics hardware. Look for a card that offers 512MB or more of onboard memory, preferably GDDR3 (graphics double data rate 3) or better.

For users looking for a better graphics experience than they can afford all in one go, AMD and Nvidia offer their multi-GPU (graphics processing unit) technologies, called respectively CrossFire and SLI. The important factor to keep in mind here is that if you want to add a second graphics card down the road, you'll need a motherboard that has two PCI-E x16 slots. Also, you'll need to make sure the motherboard supports SLI or CrossFire. Based on our tests, you can expect to see a 40% or better performance boost when you use two graphics cards.

Unfussy onlooker. If you're looking for an affordable graphics card that easily outperforms an integrated graphics adapter, take a look at the ATI Radeon HD 2400 Pro (\$55; ati.amd.com). This card won't handle modern games well, but it will handle most common tasks. It's also robust enough to let you view

You'll be hard-pressed to find a graphics application that trips up the GeForce 8800 GTS, even at high resolutions.



The ATI Radeon HD 2400 Pro is a perfect graphics card for casual users.



The Radeon HD 2600 XT is a great midrange card for mild gaming and graphics applications.

Windows Vista in all its graphical glory.

Multimedia maven. If you typically use your PC for mild gaming, movie watching, photo and video editing, and a handful of graphically demanding tasks, we recommend the ATI Radeon HD 2600 XT (\$149; ati.amd.com). This midrange card has 256MB of GDDR4 memory, ATI Avivo HD technology, and UVD (Unified Video Decoder) for excellent high-definition video playback performance that doesn't bog down your

CPU. The Radeon HD 2600 XT is also CrossFire-capable, so you can double up if you manage to scrounge up the extra dough later on.

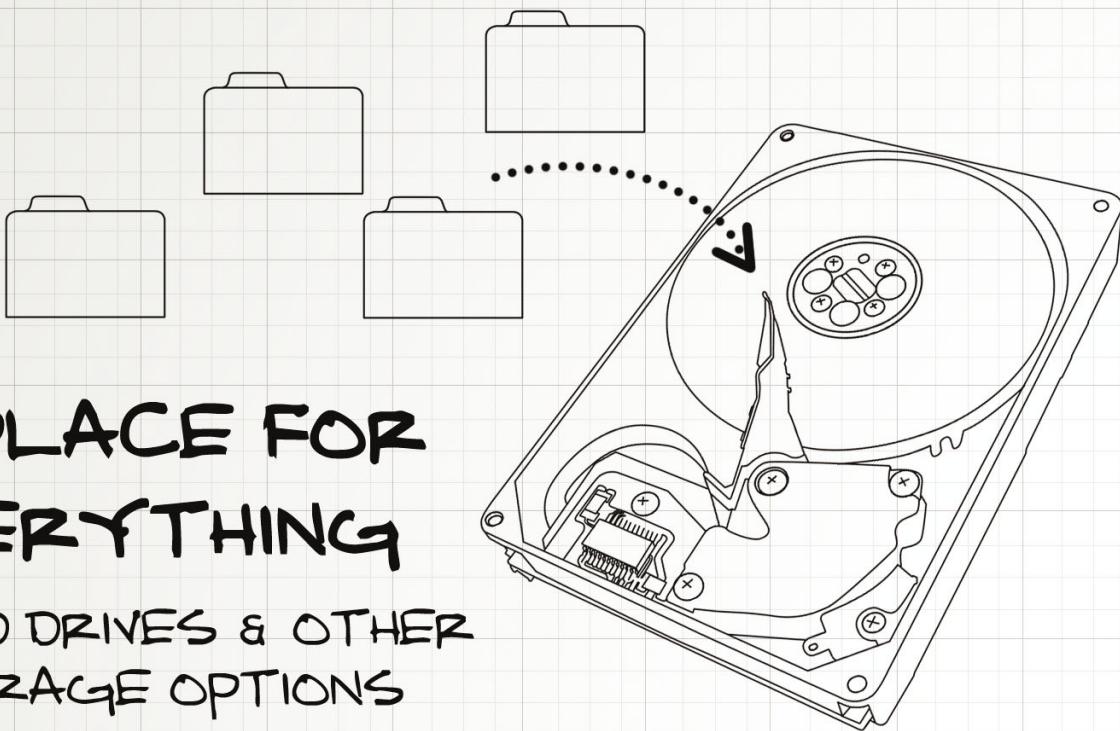
Graphics guru. If you're serious about graphics, then you will definitely want to get a high-end graphics card. Nvidia's GeForce 8800 GTS (\$399; www.nvidia.com) isn't the top of the heap (that honor goes to the GeForce 8800 Ultra), but it does deliver excellent gaming and multimedia performance with any graphically intensive application you can throw its way.



Any Way You Like It

Building a PC may not be for everyone, but it's easy to find the right graphics and audio hardware to meet your needs and budget. And whether you're inspired simply to upgrade your current components or to build your own complete PC, now you know everything you need to know to get the most bang for your A/V buck. ■

BY ANDREW LEIBMAN



A PLACE FOR EVERYTHING

HARD DRIVES & OTHER STORAGE OPTIONS

It all boils down to data. Your new Intel Core 2 Duo is super-fast at processing data. Your gleaming new Radeon video card can churn out beautiful video and photos, which are also encoded as data. The computer you're building will be a marvel with office applications, Internet browsing, your personal music collection, your grandkids' games—all data. Without data, your new computer is just a garish end table. And without storage devices to house that data, you might as well not even turn it on.

Two things your new PC definitely needs are a hard disk drive and a CD/DVD drive (discussed in the “Optical Drives” sidebar). The hard drive, which stores data magnetically on spinning disks, is the storage device for your OS (operating system), applications, and personal data. It’s considered “primary” storage, which is our focus in this article.

Of course, technology marches forward. There are interesting new developments in storage, especially in some upstart technologies based on flash memory. We’ll talk about our recommendations for a typical computer

you may build today, but we’ll also give you a heads-up on what the future may bring.

Hard Drives

Your hard drive determines how much data your computer will hold (that is, until you add an external or second internal drive for extra room). It also affects how responsive your computer will seem during use.

Hard drives still hold more data than other storage media and do so at the lowest cost (about 34 cents per gigabyte at retail prices). Desktop drives with 3.5-inch disks inside are also faster at reading large files than inexpensive types of flash memory or optical discs, such as DVD or BD (Blu-ray Disc). Small wonder, then, that hard drives remain the top choice for primary storage—for now, anyway.

Current drives range from a paltry 40GB to a mind-boggling 1TB (a terabyte, or 1,000GB). Hitachi, Seagate, and Samsung each sell 1TB drives for \$399. (The industry uses rounded figures, as 1TB is really 1,024GB; 1GB is 1,024MB, and so on.)

SATA vs. PATA. Internal hard drives for consumer PCs connect to a computer through one of two interfaces. SATA (Serial ATA [Advanced Technology Attachment]) is the newest and fastest interface, boasting thin cables that don’t block the flow of air in a computer case.

The older, more common interface is PATA (Parallel ATA), also called ATA, IDE (Integrated Drive Electronics), EIDE (Enhanced IDE), UltraDMA (Direct Memory Access), and variations thereof. External drives come with eSATA (external SATA), USB 2.0, or FireWire interfaces.



Hitachi's 7K1000 is currently the fastest 7,200rpm hard drive around. It's available in 750GB and 1TB capacities with a big 32MB cache.

You really won't notice a speed difference between SATA and PATA versions of a drive. And it won't matter whether your SATA drive has a 3Gbps (gigabits per second; effectively 300MBps) or 1.5Gbps (150MBps) interface speed, nor that PATA's interface speed tops out at "only" 133MBps. The effective speeds of these interfaces are still faster than today's drives, although a 100MBps interface might slow down one of the latest models a little. SATA is the future, although PATA drives will still be available for some time.

Speed matters. A fast hard drive can make your computer feel crisper and livelier. Windows uses part of the drive as virtual memory (also called a page file or swap file) as extra storage for the faster, solid-state RAM. Even with 2GB of memory, operations such as DVD authoring and video editing can still overflow the RAM and spill over into virtual memory. A fast hard drive can make the best of the situation.

Most consumer hard drives have a 7,200rpm (revolutions per minute) spindle speed, meaning their internal disks spin 7,200 times each minute. In most cases, the faster the spindle speed, the faster the drive. There are rip-roaring 10,000rpm Western Digital (www.westerndigital.com) Raptor drives for consumer PCs, but these offer much less capacity for the money.

All other 10,000rpm and 15,000rpm drives are

intended for servers and require pricey adapter cards to work in mainstream PCs.

A big cache buffer can also make a hard drive speedier. The cache is memory that temporarily stores data moving back and forth between the drive and the PC. If the computer needs some data that's still cached from an earlier transfer, the buffer can supply it faster than it would take the drive to access its disks again. Hitachi's Deskstar 7K1000 (\$299.99 for 750GB, \$399 for 1TB; www.hitachigst.com) and a few other new drives pack big 32MB caches. Older models have 16MB, 8MB, or 2MB buffers.

Our recommendation is to buy a current 7,200rpm drive with the lowest cost per gigabyte in the biggest capacity you can afford and with a warranty of no less than three years.

Alternatively, if speed matters to you, compare specifications and benchmark results in reviews to find the fastest drive among your candidates.

Flash Memory

In the near future, flash memory will take on a bigger role in personal computers, especially notebooks. Flash is slower than RAM, but some types are much faster than any hard drive at most operations. It's also **nonvolatile**, meaning that a flash memory card will retain its photos when you turn off your digital camera, whereas your PC's volatile RAM "forgets" its data as your computer shuts down.

Flash is solid-state, with no moving parts. This means it can be more impact- and vibration-resistant than any hard drive. Flash also draws less power, which is important to mobile computers' battery life.

Hard drives are still faster at saving large files, such as video clips. However, flash is faster at retrieving small files stored on various parts of the medium, which constitutes the

SSDs (solid-state drives), such as the 64GB and 32GB FlashSSDs from Samsung, may someday replace hard drives in notebooks and other computers. That is, once their prices drop.

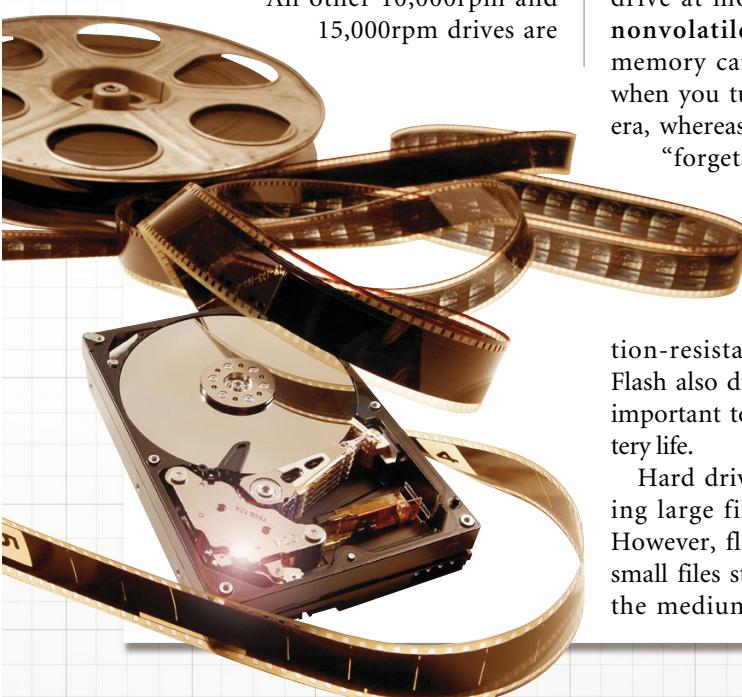


majority of data a computer requests. Flash has this advantage in random accesses because it doesn't have the long latency of hard drives, meaning it doesn't have to wait for disks to spin around to each piece of data's location. Hence, flash can offer PCs a tangible speed boost.

None of the following solid-state devices are exactly commonplace, although some will catch on. Right now, few users building a computer will opt for any of them. Still, they're interesting snapshots of the industry's search for a solid-state replacement for the old spinning-disk paradigm.

Hybrid drives. Hybrid drives combine hard drives with flash. Manufacturers such as Seagate and Samsung add 128MB or 256MB of nonvolatile NAND ("not and") memory to a hard drive. The result provides some of the benefits of flash while retaining the capacity and cost advantages of hard drives.

Notebooks with hybrid drives, such as Seagate's Momentus 5400 PSD (\$145; www.seagate.com), may enjoy slightly longer battery life because as long as requested data can be found in the nonvolatile cache, the drive won't have to spin its disks. Similarly, the cache can store data waiting to be written until the next time the disks spin up. Obviously, the more flash (Seagate hints at 512MB models), the fewer disk accesses will be required. Other benefits include faster boots and resume time from Sleep mode.



This type of caching will aid some applications more than others. However, Seagate says that Windows Vista will learn to keep the most frequently requested data in the cache semi-permanently for a cumulative, overall performance boost. And that's the catch.

"Initially, Vista will be the only operating system to take advantage of

hybrid hard drives," says Seagate's Michael Hall.

Turbo Memory. Intel's Turbo Memory, formerly code-named Robson, puts NAND flash memory on a card on the motherboard. Like the nonvolatile cache in a hybrid hard drive, Turbo Memory stores frequently accessed data so the computer won't have to wait for a disk access from a traditional

hard drive. A hybrid drive wouldn't be limited to Intel systems like Turbo Memory, but the latter could be upgraded with more memory later. (Both technologies require Vista.) Turbo Memory is available now in some notebooks in 512MB or 1GB capacities. Initial tests show little speed benefit, however.

SSD. The ultimate goal for many is an SSD (solid-state drive), such as the 32GB and new 64GB models from Samsung (prices unavailable at press time; www.samsung.com). An SSD is a flash memory module that completely replaces a hard drive. It even connects to the same cable.

Current SSDs are faster than even the top desktop hard drives at accessing and reading data, if not writing it. They offer the wildly fast random accesses, high shock tolerance, and increased battery life NAND flash can deliver, but at astronomical cost. For example, DV Nation (www.dvnation.com) sells Mtron SSDs ranging from 16GB (\$999) to 64GB (\$2,999).

Once SSDs eventually become more competitive with notebook hard drives on cost and capacity, they may push traditional mobile drives out of the market. However, in the near term, research firm IDC says that a hybrid drive "with 512MB of write cache and 2GB or more of read cache can provide many of the same benefits as a solid-state disk in a portable PC application, but at a lower cost."

Prognosis

As long as users continue to accumulate digital photos, video clips, and music files, the hard drive will continue its reign as must-have mass storage. However, as flash memory's prices fall and capacities rise, you'll start to see solid-state devices take over storage duties for at least OSes and applications. ■

Optical Drives

Most software comes on CD or DVD. Music and movies abound on these shiny plastic discs and the new high-definition formats, BD (Blu-ray Disc) and HD DVD. And writeable CD (700MB) and DVD (4.7GB or 8.5GB) media offer easy file distribution and archiving for pennies a disc. Yeah, your new computer needs an optical drive.



Samsung's SH-S203B is one of a handful of DVD/CD burners that use the SATA (Serial ATA) interface.

Current DVD burners cost \$35 and up online. Most can write and read virtually any CD or DVD format, including CD-R (record once), CD-RW (rewriteable), DVD+R, DVD+RW, DVD-R, DVD-RW, and 8.5GB DL (double-layer) DVD+R and DVD-R. At these prices, there's no longer any reason to buy a mere CD-RW, CD-ROM, or DVD-ROM drive.

Some optical drives have SATA (Serial ATA [Advanced Technology Attachment]) interfaces, but most still use PATA (Parallel ATA). And the higher a drive's "X" read and write ratings, such as the Samsung SH-S203B's 20X for DVD±R burns, the faster.

Blue lasers. And then there are the new Blu-ray and HD DVD formats, which use a blue-violet laser to store data more densely than can red-laser DVDs and CDs. You can buy a Blu-ray burner for your computer for about \$299 and up (retail prices), but at this writing, HD DVD drives are

read-only. Microsoft's \$179 HD DVD drive (intended for the Xbox 360 but compatible with PCs) is an example.

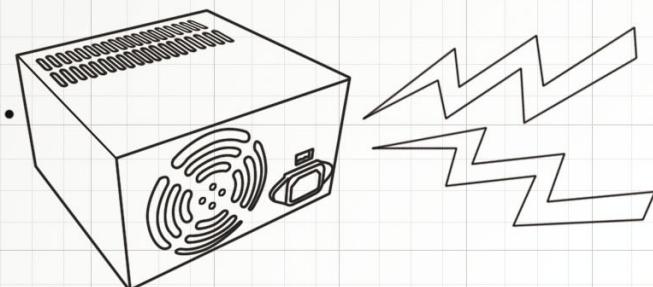
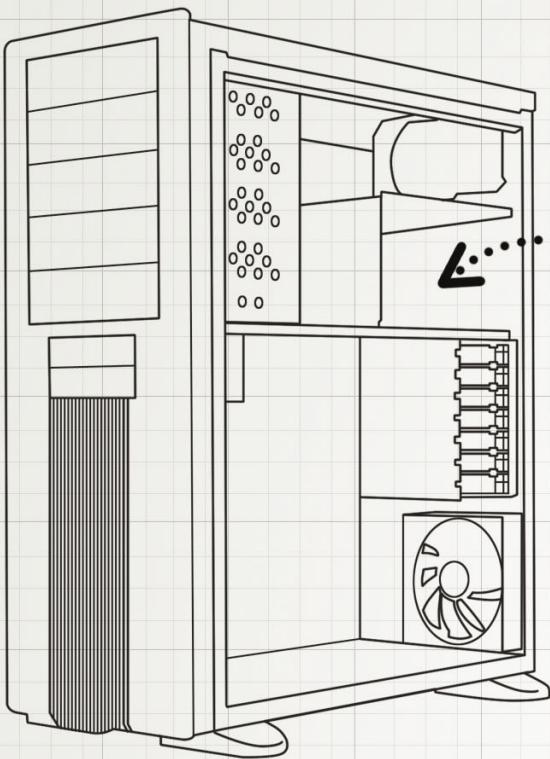
BD-R (Blu-ray Disc recordable) and BD-RE (Blu-ray Disc rewriteable) come in 25GB and 50GB (double-layer) capacities. Unfortunately, blank BD media

prices are still sky-high at \$19.99 or more per disc. HD DVD should allow data writing to 15GB, 30GB (double-layer), and 51GB (triple-layer) media when burners in those formats finally appear.

There are other points of caution. Combo drives that can write Blu-ray and read HD DVD, such as the LG GGW-H20L (\$499; us.lge.com), are still expensive. Blu-ray and HD DVD movies cost \$25 to \$40 each. And finally, assembling the proper hardware and software to play these movies on a PC at their full resolutions and image quality is tricky, to say the least. For most computer users, blue laser's time has not yet come. ■



LG sells some of the few Blu-ray burners also able to read HD DVDs. The GGW-H20L has a stiff \$499 price, but that's less than half the cost of the previous model.



GIVE IT A HOME & GIVE IT SOME POWER

THE CASE & POWER SUPPLY

So you've decided on the flashy pieces of your new computer, namely the processor, video card, and RAM. Time to address the "boring" parts.

A computer case, or chassis, is simply the box that houses your PC's devices, such as the motherboard, processor, and storage drives. The PSU (power supply unit) is a metal box with a mass of wires sticking out of it. It converts household AC (alternating current) power to DC (direct current) power that your computer can use.

Usually, people don't talk about cases and PSUs when they're describing their dream PCs, but that doesn't mean you should treat them as afterthoughts. Here's why.

The Case For A Good Case

Ideally, you want an attractive computer case with good ventilation and quiet fans. It should be easy to access and work in and come with all the parts you need, such as screws.

Most aftermarket computer cases are of the tower type, meaning they're taller than they are wide. A medium-sized midtower case is the best choice for most users, balancing interior

room for future upgrades against the bulk and weight of larger cases.

A shorter minitower case is fine for a home user with one hard drive, one optical drive, and no plans to ever tinker with the PC once it's working properly. The same goes for a

users. SFF systems are portable, but they can be tricky to assemble. Full-sized towers provide room for an amazing number of drives, fans, and/or exotic cooling devices, but they're usually very heavy and don't fit in most enclosed computer desks. There are



The Antec P182 (\$169; www.antec.com) is a steel midtower case with nice features. It doesn't come with its own power supply unit, but if it did, we'd probably trust it. Antec built its reputation on quality PSUs.



Antec's P182 case has filtered fans, a smart layout (the heavy power supply sits on the bottom), and various features to dampen noise and vibration.

space-saving desktop-style case that's wider than it is tall and meant to sit under a monitor. Because minitowers and desktop cases are so compact, it takes patience and skill to install parts and route device cables in them.

Very short SFF (small-form factor) cases and very tall full-sized towers are generally the province of advanced

also specialized HTPC (home theater PC) cases meant to blend in with the other electronics in your living room.

Most computer cases are made of steel or SECC (steel, electrogalvanized, cold-rolled, coil). Aluminum cases cost more but can help keep your hard drive and other devices a little cooler. Online prices range from about \$15 for a cheapie case with only one fan to a

head-shaking \$900 for a top-of-the-line enthusiast model. You can get by with an inexpensive case, especially if you're willing to live with a few quirks.

Problems we've encountered with some inexpensive cases include sharp edges on the inside, weak plastic around the front power and reset buttons, a lack of fans, noisy fans, and low-quality switches. A cheap case might also have some slight misalignment here and there, such as between the motherboard and the rear expansion slot cutouts. However, we've found minor problems like these in pricier cases, too.

How to buy. Lian Li (www.lian-li.com), Antec (www.antec.com), Cooler Master (www.coolermaster.com), and Apevia (www.apevia.com) are popular with computer builders looking for features and value at various price ranges.

Make sure that your new case comes with at least two quiet fans, preferably one at the upper rear of the case and one at the lower front. If there are fan speed controls, you'll be able to balance the amount of cooling needed against the level of fan noise. We also

getting clean, reliable power from its PSU, you'll encounter frustrating freezes, errors, and crashes.

Unlike a computer case, you should not try to get by with a cheap power supply. The trouble with no-name PSUs is that you often get what you pay for. Quality components and interior heatsinks (the latter of which add weight, so beware any PSU that weighs next to nothing) help a power supply not only to run smoothly, but also to react predictably to sudden changes in your computer's power draw. For instance, if your PC hangs or shuts down when you start watching a Blu-ray movie or when your grandson loads a video game, the trouble might be that your power supply can't handle the sudden demand from your video card.

Some computer cases come with a power supply preinstalled. If it's an off-brand PSU, replace it with a quality PSU from a reputable manufacturer. Don't throw the original power supply away, though. A spare PSU may come in handy when you're troubleshooting a computer problem.



The \$189.99 Corsair HX620W power supply has a 620W rating, a five-year warranty, and a well-deserved reputation for quality.



Corsair's HX Series power supplies are modular, meaning you only need to connect the (included) power cables your computer needs.

recommend cases with front- or top-mounted ports for things such as USB and headphones. The less you have to fumble around the back of a computer trying to connect cables, the better.

More Power, Mr. Scott

The most underrated device in your computer is actually crucial to its stability. If your motherboard isn't

How to buy. In our tests, we've had good luck with brands such as Corsair (www.corsair.com), PC Power & Cooling (www.pcpowercooling.com), Antec, Enermax (www.enermaxusa.com), OCZ (www.ocztechnology.com), and Cooler Master.

Power supplies have a ton of confusing specifications, and few manufacturers report them the same way. Most power supplies are sold by the wattage

they can provide to a computer on a continuous basis, such as 520W or 850W. The more powerful and plentiful the devices you put into your PC—especially the CPU and graphics card—the more wattage you'll need. Prices range from about \$20 for 180W to \$499 for 1,000W or more.

How much wattage do you need? Get a ballpark figure with an online tool such as the eXtreme Power Supply Calculator Lite (www.extreme.outervision.com/psucalculatorlite.jsp). Simply select the devices you plan to install in your new PC, and the Calculator will give you a recommended minimum wattage for a new PSU.

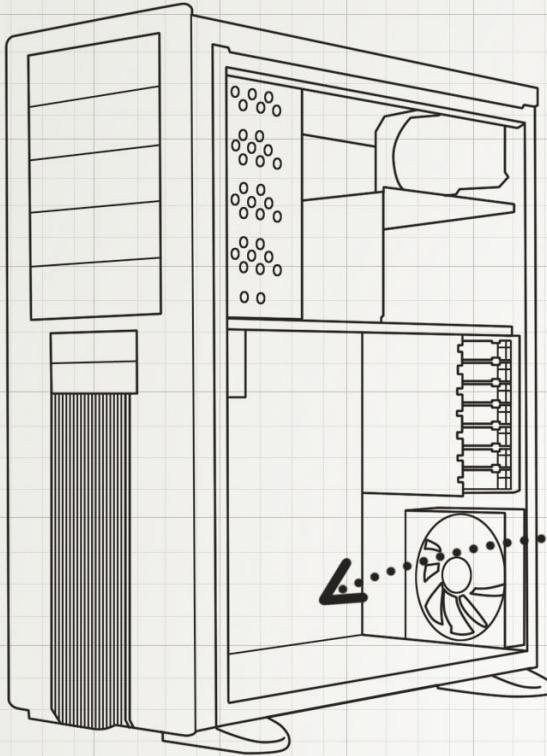
Before you shop, however, be aware that there's a trick to wattage ratings. Look at the temperature at which the manufacturer rated a power supply's continuous wattage, such as 750W at 50 degrees Celsius (122 degrees Fahrenheit) or 40 C (104 F). The higher this temperature is, the more "honest" it is in light of the temperatures inside a typical PC. For example, a PSU rated for 600W at a mere 35 C (95 F) may only be able to supply 550W or less in a PC with a hot-running processor, RAM complement, and video card.

If you buy a high-wattage power supply with the latest connector types, you'll probably be able to keep using it after future PC upgrades. Some connector examples are 8-pin EPS12V for supplemental CPU power, 24-pin main power, and 6-pin and 8-pin PCI Express for video cards. Some connectors split to support more devices. For example, a 24-pin main power connector might split into 20-pin and 4-pin connectors to accommodate older motherboards with 20-pin sockets.

Penny Wise, Pound Foolish

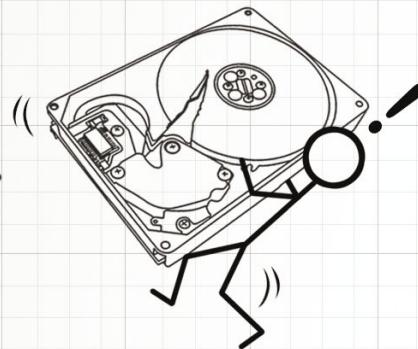
In summary, you don't have to spend a lot on a computer case, but definitely don't skimp on the power supply. Trouble-free PSU operation will let you enjoy the flashier parts of your new PC. ■

BY MARTY SEMS



SOME ASSEMBLY REQUIRED

PUTTING IT ALL TOGETHER



So you've collected all your parts to build your new computer, and there they are, sitting in a pile, just waiting to be assembled. Now the fun begins, as we take you step-by-step through putting it all together. Just be sure to follow a few precautions that we discuss in this article, and you'll have your new system up and running in no time.

Basic Prep

Before you begin, you'll want to gather a few tools and accessories you'll need in order to build your new computer. These include a Phillips and a flathead screwdriver; rubber gloves; isopropyl alcohol and a lint-free cloth; a plastic straight edge (such as a credit card); and an antistatic wrist strap (optional) and a tube of thermal compound, both of which you can pick up at online retailers or any electronics store. If you purchased any OEM (original equipment manufacturer) hardware, as opposed to the boxed retail hardware found in electronics stores, you may also need mounting screws, connection cables, and other accessories to install those components.

Static electricity can fry just about every delicate component you're

about to deal with, so make sure all of that energy is properly dissipated before you touch anything. The easiest way to do this is to touch the metal part of something near your work area that is already grounded, such as an existing PC, but you can also wear an antistatic wrist strap to make sure that static buildup won't be a problem as you put everything together.

Step 1: Case Prep

All cases are a little bit different, but you need to remove one or both sides before putting everything inside. Only remove certain parts such as drive cages and power supply cages when necessary, because you don't want to forget where everything goes.

Your motherboard likely came with a metal plate called an I/O (input/output) panel that has precut holes to accommodate all of the ports on the side of the motherboard. Replace the generic I/O panel on the case with this custom-built panel before continuing.

Step 2: Install The Power Supply

Find the cage for the power supply, remove it, slide your power supply into the cage, and reattach the cage to

the case. We'll worry about all of those cables during the next step.

Step 3: Mount The Motherboard

When installing the motherboard, handle it only by its edges and avoid touching any exposed metal. Look closely at the motherboard, and you'll notice several small holes drilled through its surface. These are where the screws go that secure it to the case, and you may need to rearrange the mounting posts (sometimes called risers) inside the case so that they match up with the holes in the motherboard. Lower the motherboard into place, making sure all of the screw holes are aligned with the case posts and that all of the output ports are aligned with the holes in the I/O panel. Once everything is lined up, use the screws that came with your case to fasten the motherboard to the case. Be gentle—overtightening the screws during this step may damage the motherboard. Do *not* install the motherboard without using risers or mounting posts; screwing the motherboard directly to the case is a sure way to destroy it and everything connected to it.

Once the motherboard is properly seated, attach the cables that came with the power supply to the appropriate

power receptacles on the motherboard. On modern motherboards, this means connecting a rectangular 24-pin ATX power cable, a square 4-pin EATX 12V power cable, and a slew of other cables for the case fans, CPU fans, case switches, USB ports, and other components. Read the manuals that accompanied the motherboard and the power supply, along with the manual for any component you are connecting, because it is possible to install certain connectors backward or attach a cable that has the wrong voltage, risking damage to the motherboard or the component. Keep everything as neat as possible, or cables you attach now may get in the way of other components you attach later.

Step 4: Install The CPU

Install the CPU by aligning it perfectly in the provided slot on the motherboard and then locking it into place. The AMD Athlon 64 X2 in our build has pins on the bottom that are keyed so that the chip can only be inserted one way. Be very gentle when positioning the CPU; it should simply fall into place if it is aligned properly. If some of the pins get bent, you can sometimes straighten them out using the edge of a credit card; more often, bent pins ruin the processor.

Once the CPU has settled into place, use whatever locking mechanism your motherboard supports to secure it there. In our setup, this required pushing down an arm that locked down the CPU.

Step 5: Install The Heatsink

Heatsinks sit on top of the CPU and use fans, metal fins, liquids, or combinations of those methods to soak up excess heat from the CPU and then radiate that extra energy into the air or into a tank of cooling fluid. Although the metal that will be touching looks extremely smooth, it is covered in microscopic pits that trap air, which makes it a terrific insulator but a horrible conductor of heat. Because you want to transfer as much heat as possible from the CPU to the

heatsink, it is important to apply a thin layer of thermal compound (sometimes called thermal paste or thermal grease) to the top of the CPU and the bottom of the heatsink. This paste consists of highly conductive particles of silver or silicon that settle into the microscopic pits on the CPU and heatsink so that when the two devices are pressed together, they make better contact with one another.

Some heatsinks have thermal pads or layers of phase-change compound preapplied to the portion that makes contact with the CPU. Never use thermal compound in addition to one of these preapplied products. When in doubt, either contact the manufacturer for recommendations or remove the preapplied compound and replace it with your own thermal compound. Also, avoid using no-name thermal compound. Stick with brands (such as Arctic Silver; www.arcticsilver.com) that have a reputation for doing a good job transferring heat away from the CPU.

The most common mistake people make when using thermal compound is slathering on a layer so thick that it oozes out of the sides of the CPU when the heatsink is locked into place. Remember that the thermal paste is supposed to patch microscopic defects in the metal—not replace the metal itself.

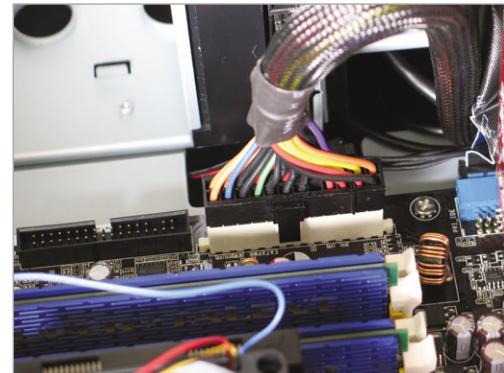
Prep the surfaces of the CPU and the heatsink using a lint-free cloth and some isopropyl alcohol so they are as clean as possible. Put on a rubber glove to apply the thermal compound. Squeeze a pea-sized portion of thermal compound in the center of the CPU; smear it around with your finger to form an even, thin layer across the top; and then scrape away the excess with the edge of a credit card or something similar. The goal here is to remove as much of the excess as possible, so don't

worry if it seems like you've taken off nearly as much as you put on. Repeat the process on the bottom of the heatsink where it will make contact with the top of the CPU and then you're ready to continue.

Our heatsink had thermal material preapplied to the bottom, so we just



The Corsair power supply used for this build had customizable power cords. These are the two power connectors that attach directly to the motherboard.



Make sure the main power supply to the motherboard is properly connected to prevent damage when the system is booted.

mounted it using the set of retaining clips on the side. We had to use a flat-head screwdriver to push everything into place, and we then locked the heatsink down by pushing a lever located on the side. Connect the power cable from the heatsink fan to the appropriate power connector on the motherboard to complete this step.

Step 6: Install The Memory

Memory is very easy to install. Simply open the locking clips located

on either side of the memory slot, align the memory chip over the slot so it is as straight as possible, and gently push straight down until the locking clips swing into place. You may need to push the clips with your thumb a bit to get them to close completely. The memory chips are keyed so that they only go in one way, so if you feel like a lot of force is needed when pushing, look to make sure that they are facing the right direction.

Memory often works best if it is installed in matched pairs of chips, so check the motherboard's documentation to see which slots to use if you are installing more than one chip. In our system, the slots were color-coded for easy pairing.

Step 7: Install The Hard Drive

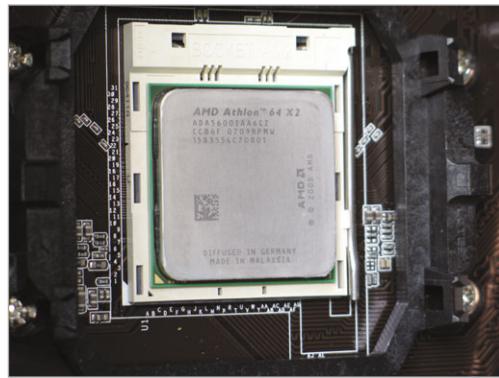
Most cases have perfectly sized hard drive cages that contain rails, trays, or other mechanisms that let you easily slide the drive in and out of the cage. Remove one of those mechanisms, attach it to the hard drive using the screws included with the case, and slide the drive into the cage.

Because you are building a brand-new computer, we'll assume you're using a SATA (Serial ATA) drive instead of an older PATA (Parallel ATA) drive. The drive or your motherboard should have come with a SATA cable that connects the drive to the

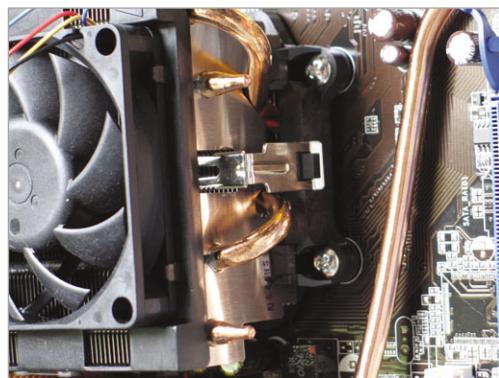
motherboard and a power cable that connects it to the power supply. Connect one end of the SATA cable to the back of the drive and the other end to one of the SATA connectors on the motherboard. Next, attach the SATA power cable from the power supply to the back of the drive (you may need to use an adapter, which comes with most drives).

Step 8: Install Optical Drives

Optical drives, such as DVD-ROM and CD-ROM drives, are installed much like hard drives, but the cages for them are larger and most use wide IDE (Integrated Drive Electronics) cables instead of narrow SATA cables. You can attach up to two drives to the same IDE cable, but we recommend using separate cables for each drive if possible for maximum performance. Move the plastic jumper block on the back of the drive so it is in the Cable Select position, attach the drive to your mounting hardware, and then slide it into the cage. Attach the black end of the IDE cable to the back of the drive and then attach the blue end to the IDE port on the



This CPU won't fall into place until the arrow in its bottom-left corner matches up with the arrow printed on the slot.



When mounting the heatsink, make sure any locking clips are completely secure.

motherboard. Attach a power cable from the power supply and you're finished. The motherboard takes care of audio going from the optical drive to

In Our System

We used the parts recommended in the other articles in this month's feature package for this particular build. Here's a breakdown:

| | | | |
|----------------------|--|-------------------------------------|--|
| Case | Antec P182 | \$169 | www.antec.com |
| Power Supply | Corsair HX620W | \$189.99 | www.corsair.com |
| Motherboard | Asus M2N-E | \$95 | usa.asus.com |
| CPU | AMD Athlon 64 X2 5600+ | \$160 (estimated street price) | www.amd.com |
| Heatsink | AMD stock OEM | Included with CPU | www.amd.com |
| Memory | Super Talent T800UX2GC4 2GB kit | \$95 | www.supertalent.com |
| Video Card | ATI Radeon HD 2600 XT | \$149 | ati.amd.com |
| Sound Card | Creative Labs Sound Blaster X-Fi XtremeGamer | \$99.99 | www.creative.com |
| Hard Drive | Hitachi Deskstar 7K1000 | \$399 for 1TB | www.hitachigst.com |
| Optical Drive | Samsung SH-S203B's 20X DVD±R drive | \$70 (estimated street price) | www.samsung.com |
| | | \$1,426.98 (estimated total) | |

the sound card, but if your sound card came with SPDIF (Sony Philips Digital Interface Format) cables and you want to use SPDIF with your sound card and digital speakers, this is the time to attach that cable to the back of the drive.

Step 9: Install Peripherals

Now it's time to install your audio card, video card, and other peripherals. Remove any appropriate port blockers from the back of the case to open up holes for these devices. When installing audio and video cards, make sure to handle them only by the edges without touching the metal contacts at the bottom.

For the video card, find the dedicated PCI-E (Peripheral Component Interconnect Express) video card slot on your motherboard, align the card so it is straight up and down, and press it straight down using even pressure until it locks into place. Next, attach a power cable from the power supply if the card requires it.

The audio card doesn't have a dedicated slot, so align it in an empty PCI slot and press straight down until the card is seated completely. Attach the SPDIF cable that is connected to the optical drive if you used it in the previous step.

Attach a mouse and keyboard to the USB or serial ports, connect the power, and get ready to boot the computer.

Step 10: Adjust The BIOS

The BIOS (Basic Input/Output System) is software built into a chip on the motherboard that recognizes and activates your hardware each time the computer boots. Your motherboard's manual comes with detailed instructions for accessing, navigating, and adjusting the BIOS, so follow the directions closely to configure all of your hardware according to the settings recommended in the manuals for all of your devices.

You can use the BIOS to select a boot device, so set it up to recognize the optical drive as the boot device in order to complete the next few steps.

Step 11: Format The Hard Drive

Retail hard drives often come with boot CDs that include tools for formatting, partitioning, and otherwise preparing the drive for use. Windows XP and Windows Vista both let you do all of this directly from their installation interfaces, so you can skip this step and go to the next step if you prefer, but the tools that come with the drive are often more convenient. If given the choice between FAT32 (32-bit file allocation table) or NTFS (NT file system) when formatting the drive, go with NTFS to ensure the best mix of compatibility, performance, and features.

Step 12: Install Windows

Swap out that installation disc for your Windows installation CD or DVD and reboot the computer. When the computer restarts, it will boot from the optical drive, and the Windows installation process begins. Follow the prompts and use the guide that came with Windows. When Windows finishes installing, make sure to boot into the BIOS and revert to using the hard drive as a boot device instead of the optical drive. Reboot the computer; Windows should load, and you're almost finished.

Step 13: Update & Stress Test

Windows likely detected and installed a lot of your hardware, but you should visit the manufacturers' Web sites to download the latest drivers and reinstall the hardware. Drivers are software that the operating system uses to communicate with hardware, and newer drivers can fix bugs and enhance performance. You also should download the latest firmware update for your motherboard's BIOS and install it using the manufacturer's instructions.

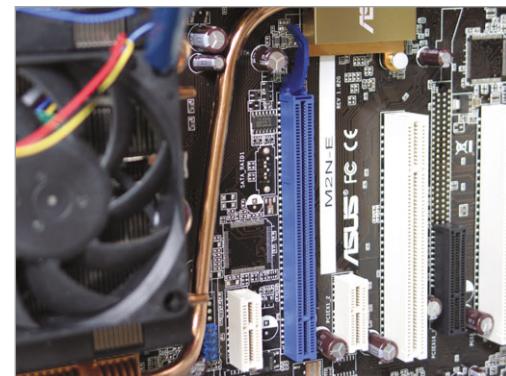
The final step is stress testing. Sometimes hardware that is substandard or

improperly installed can work for a while but fails when the computer is used frequently or is subject to a heavy workload. It is always prudent to "burn in" a new system, running it under heavy stress for 24 to 48 hours to test the system's stability.

There are plenty of programs available that help you burn in a new



This hard drive is mounted on a drawer before the power cable (black) and SATA (Serial ATA) cable (red) are attached.



The dedicated video card slot is often colored differently than the normal PCI (Peripheral Component Interconnect) slots. Here it is blue, while the normal slots are white.

system. We recommend benchmark software such as SiSoftware's Sandra Lite XI (free; www.sisoftware.co.uk). If a program such as this runs fine for a long time, your new computer should be good to go. Enjoy your new system and treat yourself to something nice with all of the money you saved by building a PC yourself. ■

BY TRACY BAKER

Security & Privacy

Keeping your information secure in an ever-changing technological world can be difficult. Malware is everywhere. Destructive viruses, worms, spyware, and adware are lurking in emails we open and Web sites we browse.

Keep up-to-date on the latest security news and information with Smart-Computing.com's Security & Privacy section in the Tech Support Center. You'll find articles on spyware, adware, and other nuisances such as spam and pop-ups. Be sure to check out the Web log to find the latest news on viruses, worms, phishing, and other important security information.

1. Go to SmartComputing.com and click the Tech Support Center link.

2. Click the Security & Privacy link.

3. Search articles to find all the security information you need. Subscribers, be sure to log in so you can add the articles to your Personal Library!



Tech Support Center

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Security & Privacy

It's called **malware** – destructive viruses and worms, intrusive spyware and adware, and nuisances like spam email and unwanted pop-ups. (Read "[A Malware Primer](#).") Check our Web log for the latest news and read our Basic Troubleshooting articles to learn how to diagnose and combat them.

How To Get Rid Of...

We'll tell you what to do to eliminate malware programs from your computer.

Web Log:

 [Firefox issues more fixes](#) Mozilla on Monday released version 2.0.0.6 that takes further steps in resolving the vulnerability presented when a user surfs a malicious Web page on... Dated 8/1/2007 10:51:47 AM [More...](#)

Basic Security & Privacy Troubleshooting Articles:

[Virus & Worm](#) [Spyware & Adware](#) [Spam](#) [Pop-ups](#)

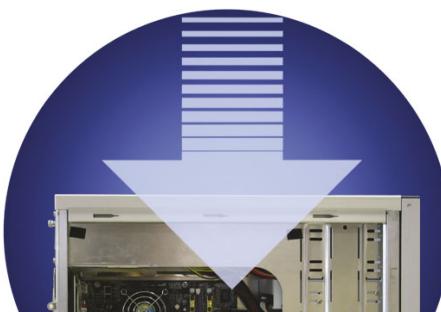


On October 3, 1947, John Perry Barlow was born in Jackson Hole, Wyo. Besides his other varied accomplishments (among them, writing songs with the Grateful Dead), according to the *Smart Computing Encyclopedia*, "Barlow is also credited with first using the word 'cyberspace' to refer to the Internet."



Tech Support

Among the top 25 most-viewed help topics at our Solutions Knowledgebase as of this writing were the Startup menu, an unbootable PC, and a slow PC. For help on these and a plethora of other topics, visit the *Smart Computing* Tech Support Center today.



Easy Installation

For help installing everything from Linux to RAM, click the **Articles On How To Install ... Just About Anything** link on the right side of the Tech Support Center.



From Smart Computing's Dictionary

Device Driver

A device driver is a program that allows a hardware peripheral, known as a device, to communicate with a computer. Device drivers typically come with the device, and updated drivers can be obtained through the manufacturer's Web site.

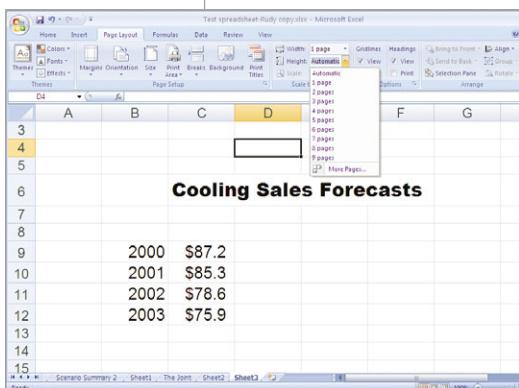
Excel 2007

Page Layout

Spreadsheet
Beginner
2007 for
Windows
XP/Vista

While Excel 2007 offers impressive new features in somewhat complicated areas such as charts and tables, we're launching our how-to articles with the area that tends to drive a lot of Excel users batty: printing. Sure, it seems a little basic, but the only people who sneer at Excel printing advice are people who have never burned 20 sheets of paper figuring out how to print a readable version of a worksheet. Excel 2007 offers help through the Page Layout tab, found in the Ribbon that runs across the top of the Excel 2007 window. Page Layout brings together many of the greatest hits of the Page Setup and Print Preview windows from previous Excel versions (although both of those still exist, as we'll discuss). This tab provides easy access to a lot of settings that used to be several clicks deep. When you learn to use them all, you'll

come a lot closer to finding exactly what you expect when you walk to the printer.



The new Page Layout tab collects most of the tools you'll need to set up easy-to-read printed worksheets.

of the choices (and you've zoomed out to a view of 50% or so), you can see dotted lines indicating where the margins will be. Click Custom Margins to enter your own preferred dimensions.

The Orientation button offers a familiar function, turning the printed page on its side (landscape) or vertically (portrait). The Size button designates the paper size you're printing to, and Excel 2007 displays dimensions right in the list next to cryptic paper names such as A4, A5, and—a new one for us—Japanese postcard.

Print Area is the place to highlight the portion of the worksheet you want to print out, which proves very handy when you want to distribute only certain parts of a large worksheet, such as one quarter's results. Just drag the cursor over a block of cells and then choose Set Print Area. You can add another, nonadjacent block by highlighting it and choosing Add To Print Area. The Breaks button lets you insert and remove page breaks where

needed, but to make them easy to work with, turn on the Page Break Preview on the View tab.

Background is the place to insert an image file that appears behind the entire worksheet. Most spreadsheets become unreadable with a complicated background, so use this feature carefully. Use something like a very light version of your corporate logo dropped behind a report.

Print Titles makes it easier to keep track of information spread across several printed pages. Let's say you've typed column headings such as "Postage," "Entertaining," and "Travel" at the top of the worksheet. If the data columns under each heading are long enough to reach past the first printed page, it may be hard to remember whether the third column on the left is Entertaining or Travel. By using Print Titles to select the row containing the column labels, you can ensure they are repeated at the top of each printed page.

The Scale To Fit tools provide an easy way to make everything fit on a page. Using the pull-down menus under Width and Height, choose the number of pages you want the printed worksheet to fit on. Excel automatically reduces the content's size to fit within the allotted space.

Sheet Options simply determines whether gridlines and headings (the letters of columns and numbers of rows) appear on printed sheets.

Going Old School

The familiar old Page Setup and Print Preview dialog boxes are never far away. Open Page Setup by clicking the small arrows at the bottom of the Page Setup, Scale To Fit, or Sheet Options sections. Many of the features in the Page Setup window are also on the Ribbon, but the window provides access to a few extras such as header and footer settings. While we're discussing headers and footers, it's worth pointing out that they represent one area where the Page Layout tab is missing a critical feature. The easiest way to set up headers and footers in Excel 2007 is on the Insert tab's Header & Footer button.

Print Preview is still the reliable way to see how Excel plans to put your worksheet on paper. You'll find it under the Office button in the upper-left corner, under the Print option. ■

BY TREVOR MEERS

Microsoft Word 2007

Using Documents From Previous Versions

Beginner

Word Processing

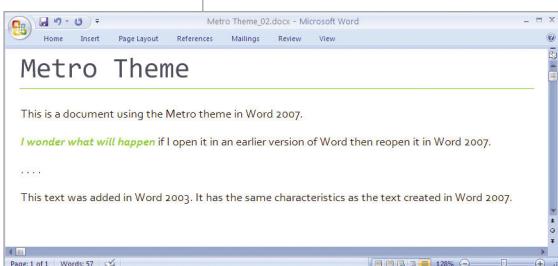
2007 for

WinXP/Vista

Last month, we gave you a general introduction to Microsoft Word 2007. Over the next few articles, we will help you get used to its new look and functions. Your first concern may be how to work with documents created in previous versions of Word.

Word 2007 documents have a new file extension, .DOCX instead of .DOC. Office 2007 documents are based on a technology called

the Office Open XML (Extensible Markup Language) Format. Office 2007 (including Word) creates files that are smaller and easier to recover if they happen to



You can open Word 2007 documents directly in earlier versions of Word if you install the Office Compatibility Pack.

become corrupted.

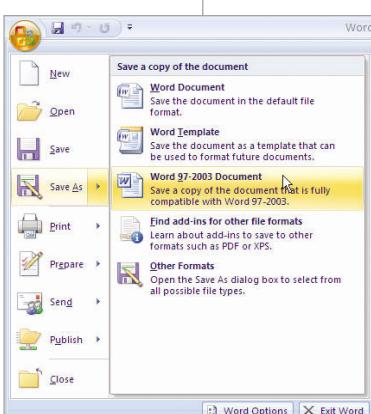
Use Original Or Convert

Open an older Word document by clicking the Office button in the upper-left corner of the Word 2007 window and choosing Open. Browse to the Word file you want to work on and click Open. By default, the document is *not* converted to Word 2007 format.

Word 2007 operates in Compatibility Mode when a Word 97-2003 document is opened. Compatibility Mode ensures that any changes you make will be readable by the older version of Word the document was created in. Word 2007's new features aren't available in Compatibility Mode. You can work on the old document and, when you're done, click the Office button, Save, and Close. Any changes you have made will be acceptable to the older version of

Word when the document is reopened.

You can also convert the old document to Word 2007's DOCX format. With the document open, click the Office button and Convert. A dialog box will open with a short description of what will happen. Click OK and the document is converted, and all of Word 2007's functions become available.



Click the Office button to save a file in the Word 2007 or Word 97-2003 format.

Click the Office button and Save to replace the original document with the new 2007 version. Click Save As and Word Document to create a copy of the document in the converted 2007 format while leaving a copy in the DOC format.

Work In An Earlier Version

You may need to save a Word 2007 document in a form that previous versions of Word can handle. There are two ways to do this. You can save them in a Word 97-2003 format or install the Microsoft Office Compatibility Pack with your earlier version of Word (and other Office applications).

The first method is simple. Click the Office button, Save As, and Word 97-2003 Document. Of course, the earlier version of Word won't be able to handle new Word 2007 features if you used them in the document. Check the Word 2007 Help system for a list of the features that don't translate to older versions.

Automatic Compatibility

The Microsoft Office Compatibility Pack lets you open DOCX files in the older application. The pack works with Microsoft Office 2000/XP. First, make sure your version of Office, including Word, is up-to-date. All of the High-Priority updates must be installed. Click Start and Windows Update to find out if you need something.

Go to www.microsoft.com and search for "Microsoft Office Compatibility Pack." Click the Download button to obtain the 27.5MB file. Double-click the downloaded file to begin installation. You can now open DOCX files directly in an earlier version of Word.

While in the earlier version of Word, it's best to only make changes to text or other simple areas. Because, for example, Word 2007 uses Themes—groups of styles used to create a cohesive look. Changing styles in a document in an earlier version of Word will change the theme. When you're done working with the file, save it as you would other documents. Later, you can reopen the document in Word 2007 and continue where you left off.

Next month, we'll continue to look at the fundamentals of the new version of this program. ■

BY TOM HANCOCK

Broderbund Print Shop Deluxe 22

Use New Advanced Photo Editor

Desktop
Publishing

Beginner

22 for Windows
2000/XP



The Common Tasks panel is where you will make most of the decisions regarding changes to a photo.



You can crop the photo easily by clicking Image and Crop. The Common Tasks pane provides the options.

Advanced Photo Editor is a new feature in Print Shop Deluxe 22. In previous versions, Print Shop users were confined to using the Photo Workshop when modifying graphics. This older feature is still available in Print Shop 22 and is called Photo Workshop Classic.

While Photo Workshop often lets you make changes to photos with a click or two, its simplicity comes at the expense of power. It doesn't have much to offer if you really want to modify a photo. Advanced Photo Editor, on the other hand, works like a (very) "lite" version of a full graphics application like Adobe Photoshop or Corel Paint Shop Pro.

Open The Editor

Create a blank project in Print Shop and place a photo from the Art Gallery on the Design Desk. In Print Shop language, a "photo" is a bitmap, or "painted" graphic; it's not necessarily an image that came from a camera. The photos you will work with in Print Shop generally can be recognized by their .JPG file name extension. Images with .GIF and .BMP extensions can also be edited with Advanced Photo Editor.

Right-click the photo on the Print Shop Design Desk and click Edit Using Advanced Photo Editor. If you right-click and the option Advanced Graphic Editor appears instead, the graphic will need to be edited with Advanced Drawing.

Three Areas To Examine

The Advanced Photo Editor has three main areas. The largest holds the image of the photo being worked on. The photo can be viewed in two ways: Current or

Preview (these options appear as tabs when you make a change to a picture).

The top area of the application has two toolbars: Main and Drawing. There isn't a button to open a graphic or save a modified one under a new name. You can copy and paste and perform screen captures within Advanced Photo Editor if you want to take a graphic into a different application.

The Drawing toolbar contains the paint tools that are typical for this type of application. By clicking buttons, you can select areas within the photo, draw lines, create shapes like rectangles, and fill or airbrush areas with colors.

The third area of the application is a panel or group of panels on the right-hand side. The area can contain a Common Tasks tab, where you will spend most of your time, and a Survey tab that allows you to focus on particular areas of a photo at different magnifications.

To open these panels, click View and one or more of the following: Common Tasks Panel, Tool Options Panel, and Survey Panel. You can move the panels around, resize them, or set them to auto-hide by clicking the stickpin symbol in the bar at the top of the panel.

We found use of the panels to be problematic at times. For example, Tool Options is not a panel unto itself; it's part of the Common Tasks panel. At times, the application menu shows the panels as not being open when they are. Panels may be hard to drag to where you want them. We recommend you find a setup for the panels that you like and then not vary from it unless you need to.

The Tools

By default, the Common Tasks panel contains the areas Editing Tasks, Editing Tools, and Tool Options. The entire panel will change to reflect options available if you choose a particular menu item, such as Image and Crop.

The panel areas can be displayed or hidden by clicking the double-arrow button next to their names. The Editing Tools area contains all the paint tools in the Drawing Toolbar. The information displayed in the Tool Options area will vary depending on which tool you have chosen.

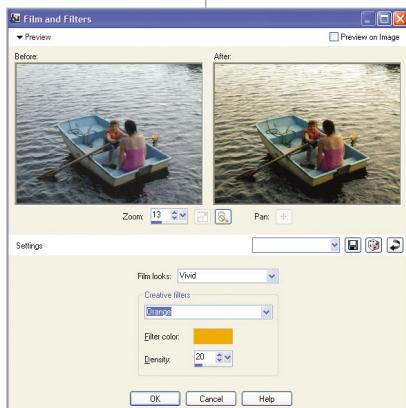
Put Artistry To Work

In addition to being able to undo your changes through several levels, the application lets you preview them at any time. Changes become permanent when you click File and Return To The Print Shop Deluxe 22. Explore the options in Print Shop to apply a personal touch to your photos. **II**

BY TOM HANCOCK



Use Paint Shop Pro Photo's new Organizer to manage all your photos.



Paint Shop Pro Photo XI includes two new major categories of visual effects. In this example, we chose to use the Film And Filters effect.

Corel Paint Shop Pro Photo XI

Version XI Overview

Long-time Paint Shop Pro users have always known that the program has very little to do with painting. The application's name (in our humble opinion) didn't accurately indicate that this is a robust photo-editing program. No longer. The newest release is aptly named Paint Shop Pro Photo XI. The name isn't the only item that's new, however. Corel has a history of substantial upgrades with each release, and version XI carries on that tradition. Here are a few of the new features that we will discuss in depth over the coming months.

(NOTE: If you're upgrading your operating system to Vista, be sure to install the free Paint Shop Pro Photo XI Vista update. You can see a list of all system requirements and download the Vista update at www.corel.com.)

The Organizer

We tip our hats to Corel for introducing the Organizer to version XI. Previously, if you wanted to locate a photo on your PC, you had to browse through a standard Windows menu or search through the Windows Search function. It was difficult to view multiple photos and nearly impossible to sort by keyword.

The Organizer changes all that. It's a movable, resizable window that docks at the bottom of the application by default, and it allows you to easily view, sort, and manage your images. The advanced search feature, for example, lets you search by image name, date, size, file type, tag words, and rating. You can save your searches, edit them, or rename them.

There's more to organizing photos than searching for them, of course. Each image has a General Info box. Click the image, and you'll see data such as the name, date it was taken, the rating, caption, size, resolution, and advanced information such as the make and model of the camera that took the photo and the exposure time.

The Time Machine

You can't go back in time and "do over" a mistake, but PSP Photo does let you go back in time with its Time Machine feature. You can take one photo and apply any of seven effects so that it appears as if the photo were taken at various points in time. The Daguerreotype style has the dark look and feel of photos taken from 1839 to 1855. The Cyanotype style has a brilliant blue overtone. And the Early Color style has a soft, grainy aspect.

New Effects

Depth of field is a technique that focuses the viewer's eye on one object in a photo, relegating everything else to background status by blurring the items around the main object. To achieve this outcome, you typically would need a higher-end camera that allows for a large range of aperture settings, rather than the smallest possible setting that ensures the entire image (or most of the image) is in focus. PSP's Depth Of Field effect lets you simulate it after you've taken the photo.

PSP Photo XI also includes a variety of new effects that are grouped under the Film And Filters effects. Film Looks are known by the type of effect they achieve, such as Muted Reds, Vibrant Foliage, and Warm Earth Tones. Creative Filters apply color to an entire photo, and they include such categories as Night Effect, Champagne, and Sunset. You can apply the effects separately or combine a them for an entirely new effect.

Other Features

Naturally, Paint Shop Pro Photo XI includes most of its earlier features, and some of these have been updated, as well. For instance, the Crop tool lets you easily choose a predefined crop size, such as a 4- x 7-inch photo. The Curves and Levels dialog boxes have histograms and enhanced rendering. And a preview window lets you double-check images before you send them via email.

This month's article simply introduces some of the upgrades present in PSP Photo XI, and we have yet to explore some of the new features. We look forward to doing that in future columns. ■

BY HEIDI V. ANDERSON

PowerPoint 2007

Creating SmartArt Diagrams

PowerPoint 2007 advances the program's constant move toward more professional-looking built-in art tools. The improvements aren't just in quantity of graphics, but in sophistication, as well. As you'll see when you start exploring features such as SmartArt, the new PowerPoint provides subtle design tweaks that can fool a lot of audiences into thinking you're an undercover designer. SmartArt, in particular, applies slick-looking designs to the kinds of diagrams you've probably created from individual boxes and lines in the past.

Look for the SmartArt button on the ribbon's Insert tab, in the Illustrations section. Click it to open the dialog box with the SmartArt choices inside. Options are categorized by type of diagram, including List, Process, Cycle, Relationship, and a few other, less common, types of diagrams. When you click a category, you'll see thumbnails of all the available options. Click one of those to see a larger preview on the right side of the dialog box, along with a short explanation of situations that suit that particular diagram. You'll find diagrams designed for lists of interconnected information, lists with large amounts of text, and more.

Basic Formatting

When you find a diagram you like, click it in the dialog box and then click OK to add it to the active slide. Now it's time to customize the diagram for your needs.

Diagrams include placeholders for text. Click in them and start typing to add information.

As you type, PowerPoint adjusts the font size so the words fit into the allotted space. You can manually change the font, its size, its color, and other elements by highlighting text and using the Font tools on the Home tab. Better yet, look for the ghostly toolbar that appears when you select text. Move the cursor over the toolbar to make it usable.

SmartArt diagrams can act as an overall unit or individual parts, depending on what you click. To move or resize the entire diagram, click it and look for a frame with handles that encompass the entire diagram. Drag the handles as needed. To modify a

single object, such as a box or triangle within a diagram, click it and look for handles around just that object. Other parts of the diagram may automatically change shape to accommodate the enlargement (or reduction) you just made.

SmartArt Tools

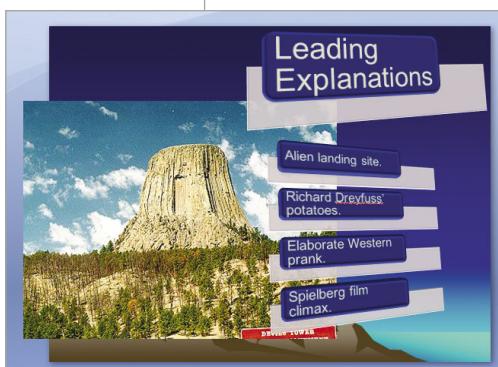
For more formatting options, click the diagram and look for a new tab called SmartArt tools. The leftmost section, Create Graphic, includes some fast ways to alter the diagram. Add Shape, for example, adds another section that usually resembles those built into the diagram. The Promote and Demote tools move bullet points up or down in the hierarchy, inserting a whole new shape if promoting an item requires that.

The toolbar's Layouts section lets you try out different kinds of diagrams on the information you've entered. Remember to take advantage of Office 2007's Smart Preview feature. Rest the cursor over an option to temporarily apply it to the diagram on the active slide and click the option to apply it. When you choose a new layout, any changes you entered or color changes you made appear in the new diagram.

The Change Colors button presents a large palette of color combinations you can apply to entire diagrams at once. The SmartArt Styles section might be the coolest part of the whole package. It lets you apply packages of shades, shadows, and angles that create looks more impressive than some of the graphics you see on the evening news.

Joining SmartArt In Progress

Since you're in the habit, you'll probably still create plenty of plain-text bullet lists that you realize later would look better as a SmartArt diagram. Anticipating this change of heart, PowerPoint's designers placed the Convert To SmartArt button in the Paragraph section of the Home tab (the tiny button, which is located in the Paragraph section, that looks like a fat arrow with a sheet of paper on it). Click the button and hover the cursor over the diagram types to see how your bullet list would look in each style. Click one when you're ready to make the conversion. ■



Trade dull diagrams and bullet lists for quick SmartArt options that add a fresh, professional look.

BY TREVOR MEERS

Online

Edit Your Photos Online With Picnik

Picnik

Intermediate

If you already store your photos online at a site such as Flickr, you might want to edit them online, as well. The Web features a bevy of free (or nearly free) online image editors that include simple tools for cropping, resizing, adjusting exposure, and removing the dreaded red-eye effect.

The best online photo editor we've seen is Picnik, which offers all of the tools most shutter-bugs need in an easy-to-learn package. At press time, all features of the Picnik beta version were free. Give Picnik a try at www.picnik.com. You can register with an email address or simply click the Photos tab on the main page to get started.

Picture It

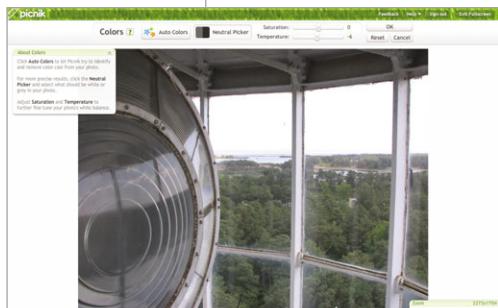
The main Picnik toolbar features several ways to load photos from your computer or the Web. You can import directly from photo-sharing sites Flickr, Picasa, or Facebook, so long as you provide

Picnik your account IDs and passwords for those sites. You can also upload a picture from your computer, download a picture from a specific URL, or search for and download publicly accessible photos through Yahoo! or Flickr. You can also take a new pic-

ture using your Web cam and upload it directly to Picnik for some quick editing.

Choose an image to edit, and it will appear in the main Picnik Edit screen. Each of the tools in the Edit tab includes some nice touches that smooth out the editing process. For instance, choose Crop and you'll see a rule-of-thirds grid superimposed on your picture. You can move the grid about or resize it. The toolbar at the top of the Crop window offers different options for constraining the result to particular sizes or ratios for different situations, including a wide variety of chat buddy or avatar icons that you can use for various Web sites, including MySpace and YouTube, among others.

Other tools work just as easily. The Rotate command, for instance, includes the standard 90-degree angles, as well as freehand rotation to straighten out those stubborn crooked horizons. More advanced Picnik tools, such as Exposure and



Our current favorite online image editor, Picnik, makes easy work of simple photo touch-ups.

Colors, include Auto-Fix and Auto Colors buttons that make one-click standard adjustments.

The Picnik interface includes a couple of other nice features, too. An Undo button in the corner of the screen will back up each edit, all the way to the original picture, if you decide something went wrong. Each editing screen also features a Zoom slider in the bottom-right corner, so you can preview adjustments in detail. A Fullscreen button expands Picnik to fill your entire screen, eliminating the distracting Web browser toolbars to give you the maximum editing space possible. Picnik is also fairly responsive for an online utility—changes made to photos happen almost as quickly as they would in a standalone program.

Save It

When you've got your picture in final form, it's time to put it back where you found it. Click the Save & Share tab for the different options. Of course, Picnik can save the image to your hard drive. Other options take advantage of the fact that the finished image is already online. For instance, the Email Photo button lets you send the picture to anyone's email address from right within Picnik.

If you provided Picnik your ID and password for Flickr, Facebook, or Picasa, Picnik can save photos directly to those sites. Picnik can replace original photos with your edited photos so you don't have more than one copy of the same image. Picnik even lets you edit photo descriptions and other features, such as Flickr's tags and privacy levels.

Overall, Picnik is an impressive, simple photo editor that works well with popular photo sites such as Flickr and Picasa. As we mentioned, however, it's far from the only online editing tool out there. One more comprehensive picture editor worth a look is Fauxto (www.fauxto.com), which includes layer support and drawing tools. Fauxto loads up in its own window, complete with menus and a toolbar that reminds you at first glance of Adobe Photoshop. It's beyond overkill for most people looking to give their photos a simple touch-up, however, and figuring out the interface could be a bit daunting for the uninitiated. The choices are legion, but for now, at least, we're sticking with the well-designed and easy-to-use Picnik. ■

BY ALAN PHELPS

Quick Tips

Secrets For Succeeding In Common Tasks

BY STEPHEN J. BIGELOW

USB Hard Drives

Question: Is it better to leave my USB drive attached to my PC or reconnect it through the new router?

Answer: You can leave the USB 2.0 external hard drive attached to the PC, but only that PC user will be able to use the drive. The USB port on the new router will allow you to make the drive network-accessible so other PC users will be able to access and share the drive.

If you attach a USB hard drive to the new router, be sure that the drive is properly configured through the router's Web-based management software. Once the hard drive is recognized, you'll need to define network shares on the drive. This is basically a process that creates logical volumes using free space on the hard drive. You'll then need to map the new shares on each PC that will have access. The router's manual should walk you through the setup details.

Printers

Question: My new ink cartridge appears to be loose. How can I secure it in the cartridge holder?

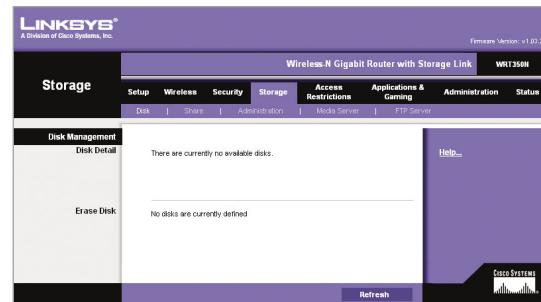
Answer: First, double-check that you actually purchased the correct ink cartridge for your particular printer. Many cartridges look the same but have subtle differences in their dimensions so they are not physically compatible. Also, make sure that any tape or other packaging material is removed from the cartridge—especially the nozzle area—before

Antivirus

Question: Is it cheaper to renew my antivirus subscription or buy a new copy of the antivirus software? If I buy a newer version, should I uninstall the old version first?

Answer: It's important for you to compare prices before making any purchase/renewal decisions. For example, one security software provider we checked with wants \$49.99 to renew a subscription for one year, and that's for every PC that uses the security software. The newest single-user version of the software is \$59.99, so there is a small savings by simply renewing. However, the renewal process can be more costly when multiple computers are

If you set up a USB drive for the network, do not place personal or confidential information on the drive. Go ahead and put family photos or video clips on the network drive, but keep your Quicken or Money files on your personal PC drives.



The network drive adapter should automatically recognize the drive, but you will need to create and assign shares before other network users can see the drive.

inserting it into the holder. The new cartridge should simply snap into the holder, but check the printer's manual for any special installation guidelines or cautions that you may have overlooked.

If you still have the original ink cartridge, try reinserting it and see if it still clips into place. If it does not, you may have damaged the cartridge holder when removing the original cartridge, and the printer may need to be repaired.

involved. For instance, you could buy the latest version of the software with a three-user license for \$69.99. In this case, if you are running multiple computers in your household, you would probably opt for the new software with the multiuser license because it would be nearly half the price of renewing three computers separately.

If you're using security software from the same manufacturer, you typically do not have to disable and uninstall the current version before installing the new version. If you're opting for a product from a different manufacturer, however, you might need to uninstall the old security software first.

Wireless Security

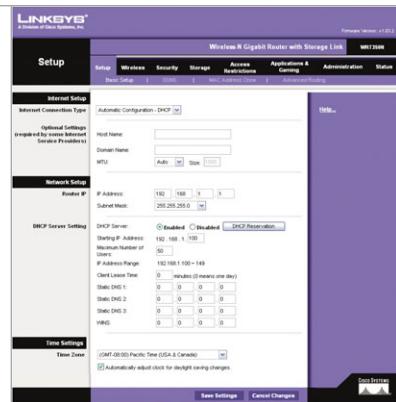
Question: I'm setting up a secure wireless network. Should I use a passphrase for the key, or should I enter hexadecimal characters manually?

Answer: The latest security standards, such as WPA2 (Wi-Fi Protected Access 2), generate hexadecimal encryption keys for you based on a

Home Networking

Question: What is DHCP? Do I need it for my home network? If so, how should I enable it?

Answer: Each device on your home network needs an IP (Internet Protocol) address. Ordinarily, you'd need to assign an IP address to each device manually, which can be time-consuming. DHCP (Dynamic Host Configuration Protocol) developed as a means of automatically assigning IP addresses to network devices. If you have a DHCP server-capable device on your network, it's a very good idea to use it.



Enable DHCP (Dynamic Host Configuration Protocol) on a central networking device such as your broadband router to automatically assign and manage IP (Internet Protocol) addresses.

Wireless Devices

Question: Is it better to have an external antenna for my wireless devices, or will an internal antenna work as well?

Answer: For mobile devices such as notebooks, we'd suggest sticking with the native internal antenna or using a wireless NIC (network interface card) with an internal antenna, because there is nothing to bend, break, or get caught on. If you employ a wireless NIC on a desktop system, go ahead and use a wireless NIC with an external

passphrase that you supply. This is much easier than having to concoct and remember long strings of arcane hexadecimal characters. Choose a passphrase the same way that you would select any other password: It should be long and employ a mix of letters and numbers, and it should be easy for you to remember but hard for others to guess.

In most cases, your broadband router includes a DHCP server feature and will assign IP addresses to print servers, PCs, wireless laptops, and other devices. All you really need to do is enable the DHCP feature and choose the starting IP address. Other devices power up and request IPs from the DHCP server. However, it's important to only have one DHCP server enabled on your network. Otherwise, you may get contention for IP addresses, and therefore, devices won't get recognized and the network won't function properly.

Antivirus

Question: Is there any way to quickly check for a virus without waiting around for a full-system scan?

Answer: Many security products, such as NIS (Norton Internet Security), provide a quick scan feature that checks memory and other areas where infections commonly occur. It's a much faster test than examining every file and hard drive in the PC. In NIS, simply open the control

antenna because it may offer a slightly better radio signal, and this in turn can help overcome signal loss due to walls, floors, and other obstacles between the PC and the wireless access point.

It is possible to achieve slightly better antenna performance by replacing the stock antennas with compatible high-gain directional antennas. Always make sure that the aftermarket antenna is fully compatible with the make and model of manufacturer's NIC.

panel and select Norton AntiVirus. Click Scans and select Run Norton QuickScan. A quick scan may still take several minutes to complete, but it's definitely faster than a full scan. (Of course, most AV applications will also let you scan a specific individual file, if there's one—perhaps a recent download—about which you're concerned.) If you still suspect an infection, however, take the time to run a full-system scan.

Time For A RAID

When Hard Drives Collide

Two heads are better than one, right? You may have experienced the speed benefits of a dual-core processor, dual-channel RAM modules, and dual graphics cards. With a RAID (redundant array of independent disks), you can make two or more hard drives work together for faster performance, instant backups, or both.

Put simply, you connect the drives to your computer, use a utility to “build” a RAID, and then partition and format the new array (group of combined drives) so it

can store data. The RAID will seem like a single hard drive to your operating system.

Many motherboards have built-in support for a few RAID configurations in their integrated hard drive controllers. For motherboards without such support, there are RAID controller cards such as Startech's PEXSATA22 2-port SATA RAID 0/1 card for PCI Express (\$69.99; www.startech.com). Of course, your PC needs to have an adequate power supply and enough drive bays for a RAID made of internal hard drives.

Types Of RAIDs

Different types of RAIDs have different advantages and drawbacks. We'll list the most commonly supported ones. (Not all of these technically qualify as RAIDs, by the way.)

RAID 0 splits data over two or more hard drives in a process called **striping**, meaning that part of a file will end up on one drive, part on another, and so on. By dividing its workload, RAID 0 can nearly double the read and write speeds of a single drive. Unfortunately, there's a big catch: If either drive has an error, the data on both drives may suddenly become inaccessible. Keep your backups current.

RAID 1 stores data normally on one hard drive, but simultaneously makes an exact duplicate on a second drive for an immediate backup (called **mirroring**). Overall speed may increase slightly over a sole drive, too. However, RAID 1's redundancy “wastes” half of the total capacity of both drives. Also, it doesn't completely replace a backup stored safely offsite.

A **JBOD**, or “just a bunch of disks,” makes two or more drives share the same drive letter. The single, spanned (concatenated) partition will be the size of the total capacity of all the drives. There's no increase in speed nor data redundancy. (Some RAID manufacturers describe non-RAIDed drives in a device as being in JBOD mode.)

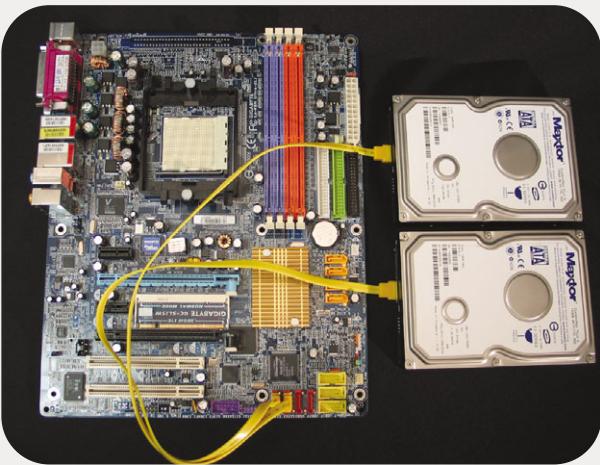
Single Hard Drive



RAIDs offer better speed and/or data safety than a single hard drive (left). A RAID 0 (center) writes different pieces of each file to two drives at once, speeding data transfers but placing data at risk of being lost. A RAID 1 (right) makes an instant backup of everything on a drive, but uses an entire second drive to do it.

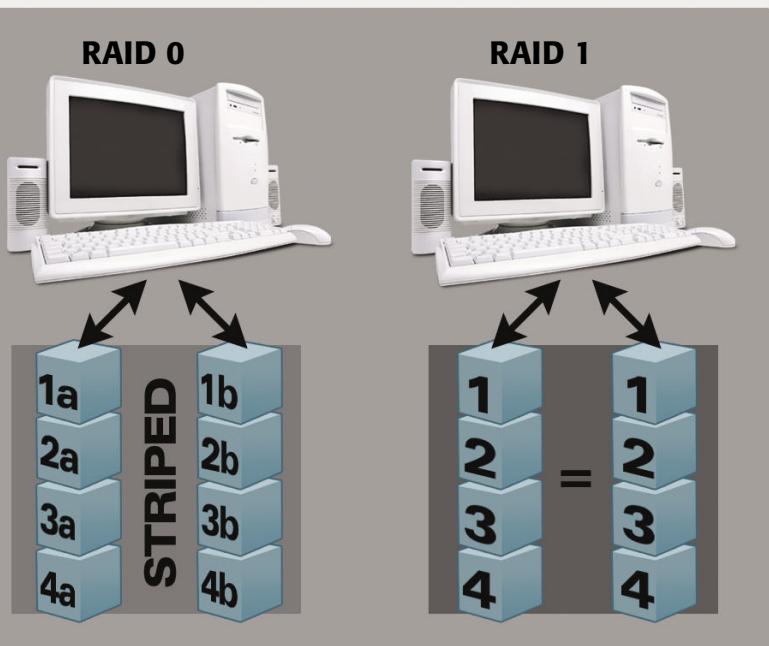
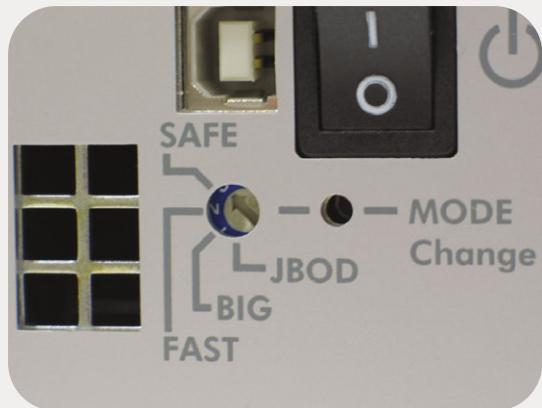


RAID 0+1 can turn four drives into a pair of fast RAID 0s, with one RAID 0 mirroring the other. In effect, it's a RAID 1 made up of two RAID 0s. Likewise, **RAID 1+0** is basically a RAID 0 comprising two RAID 1s. Despite their high cost, bulk, power requirements, and 50% usable capacity, these RAIDs offer a balance of speed and redundancy.



For a traditional RAID, buy a pair of internal hard drives with matching model numbers. Identical drives will avoid unnecessarily slow performance. You'll also need a RAID controller card if your computer's motherboard doesn't have built-in RAID support.

CMS's Velocity2 (\$549 and up; www.cmsproducts.com) lets you connect a two-drive RAID to your PC as an external drive. It uses eSATA (external Serial Advanced Technology Attachment) and comes with a PCI Express eSATA adapter card. It also supports USB 2.0, although this slows down its performance considerably.



Some motherboards support **RAID 5**, which along with **RAID 6** and other types of arrays are generally more suited to server and content creation roles. RAID 5 can increase speed as well as fault tolerance without "wasting" too much hard drive space. However, because RAID 5 requires a lot of on-the-fly data processing, it needs a special, more expensive controller in order to work at full speed. Most motherboards' RAID 5 controllers can't do the necessary calculations, so they tax the CPU instead. As a result, these "software" RAID 5s are much slower than "hardware" ones.

This switch on the back of the CMS Velocity2 lets you choose Safe (RAID 1), Fast (RAID 0), or BIG (JBOD, or spanned) modes before you start storing data on the device. CMS uses a less common definition for the switch's JBOD setting, which actually means the two drives inside won't be RAIDed and will appear as two separate disks (bypass mode).

Mix It Up

Intel's Matrix RAID technology can mix RAID 0, 1, 5, and 10 on two or more drives. For example, part of a two-drive array could be a RAID 1 for data safety, storing Windows and personal data on drive letter C:. The rest of the array's space, say the D: drive, could hold a fast RAID 0 with applications and games. The version of Matrix RAID in Intel's ICH8R controller can also build a RAID 1 with one internal hard drive and an external eSATA drive.

Whichever type of RAID interests you, be sure to read and understand the manufacturer's instructions before you build it.



What To Do When . . .

You Lose Your Wireless Connection

Now you have it; now you don't. Unfortunately, that's the nature of wireless connections. One minute your notebook is accessing your home network; the next minute your connection is lost.

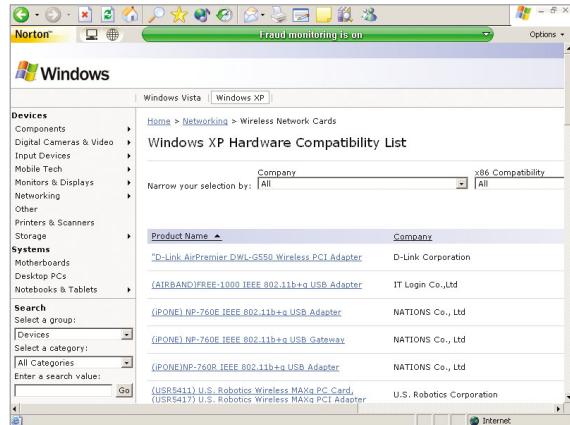
It's not always possible to prevent a disrupted connection, but these troubleshooting tips can help you reconnect when a connection is lost.

Check All Connections

It's tempting to overlook the possibility that any wireless connection problem could be due to a wire. But troubleshooting should always begin with the most obvious potential solution. In this case, make sure that everything that needs to be plugged in is plugged in.

For example, a wireless router must make several connections. First, it must be connected to a modem. Second, it must be connected to a computer. And third, it must be connected to a source of power. If the lights on the router that should be on are not on, you likely have a loose cord or plug. The same is true of the modem.

Find out whether your network adapter is compatible with your version of Microsoft Windows on the Windows Hardware Compatibility List.



So walk around your network and make sure that each hardware component that needs to be plugged in to a power source or other component is hooked up properly.

Free Up The Access Point

If all components are properly connected, then your next step is to check the network's access point. If you are using a router, the access point is your router's antenna(s). Ideally, the access point should be placed in the center of your network, and you should remove any objects that might obstruct or interfere with it. You may find, for instance, that moving your access point off the floor or a low shelf to a higher location will prevent objects from blocking the wireless signal.

Similarly, gadgets and appliances that operate on the same frequency as your network can interfere with the signal. For example, a cordless phone or microwave that operates on the 2.4GHz frequency could disrupt the signal of network based on either the Wireless B or Wireless G standard—both of which use that same frequency.

(NOTE: Wireless N also uses the 2.4GHz frequency, but it employs MIMO [multiple input/multiple output] technology. This technology uses multiple radios to increase the number of transmission and reception streams, thereby increasing the speed and range of the network.)

Therefore, as much as possible, keep the access point away from other appliances or gadgets that use the 2.4GHz frequency.

Enable Your Wireless Network Adapter

Another simple solution to a lost connection is to make sure the wireless network



adapter in your PC or notebook is working properly. The problem could be that the adapter is not inserted correctly. If you are using a notebook with a wireless network adapter, remove and then reinsert the adapter into the PC Card slot. Or, your notebook may have an on/off switch that controls the network adapter. If so, make sure that switch is turned on.

If necessary, see if Windows is recognizing the adapter through the Device Manager. Click Start, Control Panel, Administrative Tools, Computer Management, and Device Manager. Find the name of your wireless adapter under System Devices and right-click it. Choose Properties and look on the General tab. It should indicate whether the device is working properly.

Change The Channel

If none of these solutions has re-established the wireless connection, try to change the channel on the access point.

To do this, open the Web-based utility you accessed when you set up your network. Typically, you can access an online utility for a router by entering the router's default IP (Internet Protocol) address in your browser's address field. You also may need to enter a username and password. After you get to the utility, find the wireless setup section and change the channel for the router. Save your changes and close the

An outdated driver for your network adapter could be the problem of a lost connection. The manufacturer's Web site should have updated drivers you can download at no cost.

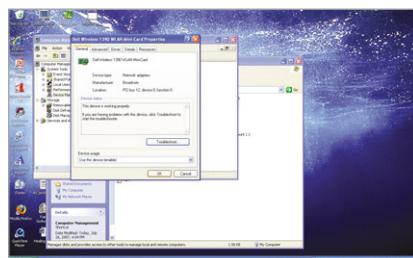
utility. Then, open the Device Manager, as described previously, and right-click your wireless network adapter. Choose Properties and on the Advanced tab, under Property, find the Channel Number. Switch the value to the same one you already chose for the access point, click OK, reboot your network, and try again.

Check The Hardware Compatibility List

Even if the network adapter is installed properly, it might still be the source of the problem if it is not compatible with the version of Windows you are running. Windows XP, for instance, supports wireless standards with the Wireless Zero Configuration service. But in order for this service to work, the adapter has to be compatible with WinXP.

To confirm or eliminate an incompatible adapter as the possible problem, go to the Microsoft Windows Hardware Compatibility List (winqual.microsoft.com/HCL).

First, choose Windows Vista or Windows XP in the gray bar at the top of the page. Next, in the Devices list on



Check to see if your network adapter is installed correctly and that Microsoft Windows recognizes it as working properly.

the left, choose Networking and Wireless Network Cards and then scan the names and model numbers of cards grouped by manufacturer. If the card is listed here, then you've eliminated incompatibility as the source of the connection problem.

However, an outdated driver for an adapter could be the source of the dropped connection. Click the adapter name to view the manufacturer's page on the Windows HCL Web site. That page lists the network adapter drivers that are available for download on the Windows Update Web site (update.microsoft.com).

Alternatively, you can go to the manufacturer's Web site and look for an updated driver there. Look under the Support section for downloads.

Go The Distance

The typical range of networks using the Wireless B or Wireless G standard is about 150 feet, whereas a network based on the Wireless N standard has a reach of about two times (or more in optimal conditions) that distance.

If you're using one of the older standards, the problem may just be that the desired range of your network is larger than what your hardware can achieve.

One solution, especially if you're trying to get a network connection on multiple levels of a home or outside, is to use an expander. An expander will boost the network's range into hard-to-reach areas of your home or office. Just plug it into an outlet within range of your router or access point. There's no need to plug it into any other component of the network.

The expander will act as a relay station by bouncing the wireless signal along to the intended destination. One word of caution about this solution: While the expander will increase the range of your network, it also might slow down the signal.

Still, a slower, steady signal is better than one that comes and goes. ■

BY RACHEL DEROWITSCH

Troubleshoot An Outlook Meltdown

Protect Precious Data Archives

Microsoft Outlook is a powerful and flexible program, and its well-structured time and data management features can help us organize our personal and professional lives. However, for most users, Outlook by default stores all its data—messages, appointments, notes, contacts, and more—in a single Personal Folders (file extension .PST) file, no matter how many different mail and contacts folders you have. (The exceptions to this rule are if you are running Outlook through a Microsoft Exchange Server or have created new PST folders and moved data there.) If your PST becomes corrupt, you could lose the entire data archive.

Corruption can occur when you get close to the upper file size limit (2GB or 20GB, depending on your version of Outlook), but it also can occur much sooner, especially if your PC crashes or freezes when Outlook is open. In this article, we'll detail ways to determine if you have one or

more corrupt PST files and how to fix them if you do.

What's Your Problem?

One common symptom of a corrupted Outlook PST file is that Outlook begins running very slowly, taking as much as several minutes to open or preview the contents of a message. Sometimes it can take so long that you assume Outlook has frozen. If you've forced Outlook to close in these situations, you've probably made the PST corruption worse. Another symptom is that Outlook won't open at all or opens but is frozen or cannot find or open your PST file. If this is the case for you, skip to the "Time For Change" section of this article.

Outlook can run slowly for other reasons, including excessive CPU (central processing unit—the brain of your computer) usage, a fragmented

hard drive, malware, and overzealous antivirus or spyware programs. To rule these out as possible causes,

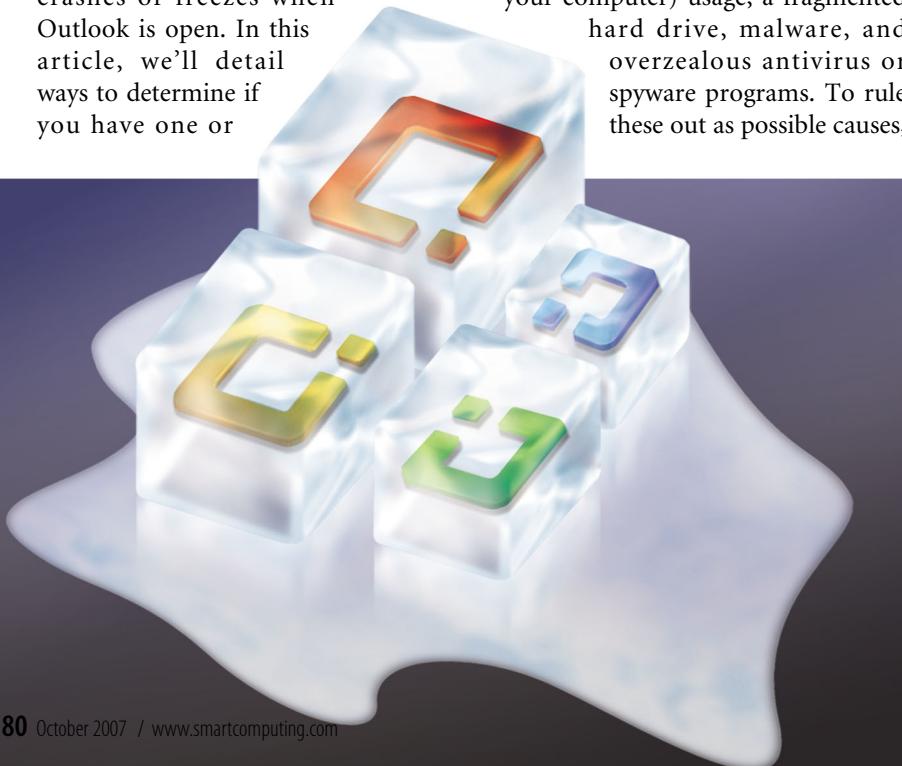
make sure your antivirus and spyware scans are up-to-date and your hard drive is defragmented. (If you do not have spyware or antivirus, check out this month's "Software Reviews" on page 22 for a free solution.)

Restart your PC and reopen Outlook with nothing else running. Close background programs like messaging, antivirus, and antispyware programs. (You should be able to do this from their icons in the System Tray, the area on the right side of the Taskbar at the bottom of your screen.) If the situation improves or happens only intermittently, your problem is likely beyond the scope of this article. Try the solutions in the "Keep It Clean" section of this article, but plan to also explore other options. The Microsoft Knowledge Base (support.microsoft.com) is a good start.

Time For Change

To see if you have a corrupt PST and try to fix the problem, use Microsoft Outlook's Inbox Repair Tool. (It won't hurt to run it if it turns out that your PST isn't corrupt.) Use the Search (or Find) option on the Start menu to look for Outlook.pst or whatever name you gave any PST file you created that you suspect is corrupt. Note the location.

Now, search for Scanpst.exe, the file name of the IRT (Inbox Repair Tool). Once you find it, double-click it. Click the Browse button and navigate to your PST file. Click Start and IRT will scan the file. If IRT doesn't find problems, skip to the "Keep It Clean" section of this article. If IRT finds problems, ensure the option to make a



backup of the file is selected and then click Repair to start the process.

If IRT generates an error message stating that it could not fully repair the file, rerun IRT. Users report it can take as many as three or four passes to repair a badly corrupted IRT. Be sure to save a backup each time, but change the name so IRT does not overwrite your original backup.

If IRT completes the repairs and closes without any errors, open Outlook and see if the problem has improved. If you cannot open Outlook or the problem continues, you should also rerun IRT. If this still does not resolve the problem, skip to "Keep It Clean." If you cannot open Outlook, skip to the "Last Solution" section of this article.

If Outlook opens, things may look normal, or you may have a Recovered Personal Folders folder and/or a Lost And Found folder in the Folder List. The Recovered Personal Folders folder may be empty; this is normal when Outlook was able to repair the PST.

If you have items in a Lost And Found folder, select New and then Outlook Data File from the File menu to create a new PST. Name the file and change the default location if you wish. At the next display, name the folder if you don't want it called Personal Folders, but otherwise accept the defaults. If you are running Outlook 2003 or later, select the option for Office Outlook Personal Folders File (.pst) to maximize storage capacity. Select Outlook 97-2000 Personal Folders File (.pst) if you will ever share this file with users of earlier versions.

Outlook will add your new PST to the Folder List. You can now drag and drop recovered items to the new PST. If there are items Outlook was unable to recover, skip to

"Last Solution" for more help.

Keep It Clean

If Outlook didn't find problems but you are still experiencing a slowdown, you may simply be overloading your PST file. Running Mailbox Cleanup (on the Tools menu in Outlook 2002 or later) is a good way to clean out excess junk—a good idea even with a repaired file. You can locate overly large or old files, view the size of various folders to see which ones need spring cleaning, and empty the deleted items folder.

From this display, you can also open AutoArchive, which is a good way to reduce (compact) folder sizes.

However, don't run it from here. Instead, from the Tools menu, select Options, click the Other tab, and select AutoArchive to establish global settings. You can also set AutoArchive properties for individual folders by right-clicking them, selecting Properties, and then choosing AutoArchive.

If you routinely keep many email messages for long periods, consider creating additional PSTs (see "Time For Change") and moving items to

them. You can also drag everything to a new PST and then delete your original PST from its location to create a fresh new file (don't change the name). After you delete it and open Outlook, navigate to the new PST.

You can keep all your PSTs open or you can open them only when you need to use them. However, having too many PSTs open at once will also slow down Outlook.

Last Solution

If you find you cannot open Outlook at all or if nothing you have tried has worked, locate the backup of your PST, make a copy of it, rename it, and give it a file extension of .PST

rather than .BAK and move it. Repair or reinstall Outlook using the installation CD. Run IRT on the renamed copy (making a backup first) and try to open it. You could also install another email client, such as Thunderbird (free; www.mozilla.com/thunderbird), and then import the file (don't let the email client import the files during setup, as it may select the wrong one). As a last resort, there are several programs, such as Advanced Outlook Repair (\$249.95; www.repair-outlook.com) and Stellar Phoenix Mailbox Professional (\$129; www.stellarinfo.com/outlook-pst-file-recovery.htm) that recover files Outlook cannot. ■



Creating one or more new PSTs and moving items there is a good way to obtain a clean PST file or to break apart an unwieldy one.



Running Mailbox Cleanup is something everyone should do to prevent folder corruption and Outlook slowdown.



Managing AutoArchive settings can ensure that your folders are compacted regularly.

BY JENNIFER FARWELL

EXAMINING ERRORS

BY JEFF DODD

Problem. A reader intermittently receives an error message. It does not prevent him from using his computer.

Error message. Server Busy. This action cannot be completed because the other program is busy. Choose “Switch To” to activate the busy program and correct the problem.



Problem. A reader is having problems with his DVD drive. Each time he tries to access it, he receives an error message.

Error message. Windows cannot start this hardware device because its configuration information (in the Registry) is incomplete or damaged. (Code 19)

Solution. The text of this message says it all: A problem in the Registry prevents you from using your disc drive. The solution is to repair the Registry. You can try to do so by accessing System Restore—open the Start menu and burrow through the All Programs, Accessories, and System Tools folders—and reverting back to a restore point that precedes the appearance of the error message.

If the problem predates your oldest restore point, or if System Restore is unable to resolve the issue, then you need to try something else. Specifically, you should let Windows help you troubleshoot the problem. Access the Device Manager by opening the Start menu, right-clicking My Computer, selecting Properties in the pop-up menu, choosing the Hardware page tab in the resulting System Properties dialog box, and clicking the Device

Solution. This error message typically occurs whenever system resources are unavailable to a program that needs them. Sometimes the message appears in conjunction with a particular program or action. In these cases, we might recommend a particular solution. But when the error occurs randomly, as in this situation, the cause is difficult to determine.

It may be that a malware program is lurking under the placid surface of your Desktop, mooching valuable system resources for its evil purposes. For this reason, we recommend that you start the troubleshooting process

by running antivirus and antispyware scans of the entire system.

Alternatively, the problem may be a piece of legitimate software that has destabilized your system. Try removing any programs or hardware components that you installed at approximately the same time the error message first appeared. We also recommend installing all available Windows updates and cleaning all unnecessary debris—such as temporary files and temporary Internet files—from the system. Hopefully one of these maneuvers will resolve the issue. ▀

Manager button. The Device Manager will appear on-screen. Look for a yellow exclamation point icon under the DVD/CD-ROM Drives heading and double-click the corresponding drive. On the General page of the resulting drive properties window, click the Troubleshoot button. This opens the Troubleshooting wizard. Proceed step-by-step through the wizard.

If the troubleshooting wizard cannot resolve the issue, try reinstalling the driver. Return to the drive properties window and open the Driver tab. Click the Uninstall button to remove the old driver and then return to the Device Manager and open the Action menu.

Select the Scan For Hardware Changes option. Device Manager should identify the drive and reload the default driver. That may fix the problem.

Then again, it may not. As a final attempt at a solution, try loading an older system configuration that was known to function properly. Reboot the system while pressing the F8 key repeatedly. This will open the Windows Advanced Options Menu. Highlight the Last Known Good Configuration option and press ENTER. Check the drive when the system restarts. Hopefully the drive will function properly. If not, you may need to consider investing in a replacement drive. ▀



Problem. Before leaving town for an extended vacation, a reader unplugged his computer as was his habit. He plugged it in again when he returned two weeks later. Now he cannot access the Internet because he receives an error message each time he tries to run Internet Explorer 7.

Error message. The instruction at 0x7c9106c3 referenced memory at 0x42d1d9c6. The memory could not be “written.”

Solution. This error message is most likely the result of file corruption. We cannot divine the source of the corruption, although we can say with some certainty that it was not caused by the



simple act of unplugging your computer. Doing so before an extended vacation is a prudent course of action.

Whatever the reason, we recommend that you uninstall your browser by accessing the Add Or Remove Programs utility, locating Windows

Internet Explorer 7 in the list of Currently Installed Programs, and clicking the Remove button. Follow the on-screen instructions to complete the uninstall process and then reboot the computer.

To reinstall Microsoft’s latest browser, open Internet Explorer 6—uninstalling IE7 automatically restores IE6 as your computer’s default browser—and head to the Internet Explorer home page at www.microsoft.com/windows/products/winfamily/ie/default.mspx. Click the Get It Now link and follow the on-screen instructions to download and install the browser. The new browser will replace the corrupted code and should eliminate the error message. ▀

Problem. Each time she opens or shuts down her computer, a reader encounters an error message that locks up her system.

Error message. Svchost.exe. Application error. The instruction at 0x745f2780 referenced memory at 0x00000000. The memory could not be “read.” Click OK to terminate the program.

Solution. This error points to a known bug in Automatic Updates. The solution is to download and install an available patch from Microsoft. You can get the appropriate patch for your system by visiting the Update For Windows XP site at snipurl.com/1osze.

When the site opens, you may be prompted to click the Continue button so that Microsoft can validate your copy of WinXP. A Security Warning window will ask whether you want to install the Microsoft software. Click the Install button to proceed. If the Security Warning window does not appear on-screen, look at the Information Bar that appears below the browser’s



Address Bar. The Information Bar will contain a message stating that the site requires an ActiveX control. Right-click the message and select Install ActiveX Control from the resulting pop-up menu. The Security Warning window will appear on-screen shortly. (NOTE: Microsoft will bypass the validation process if your browser already possesses this ActiveX Control.)

Following validation, you will return to the Update For Windows XP site. Review the information presented on-screen and specify your Internet connection speed in the Estimated Download Time field. Click the Download button to proceed. When

the File Download window appears on-screen, click the Run button. The file will download, and then you will see another Security Warning window; click Run to access the Software Update Installation Wizard. Follow the on-screen instructions to complete the update. Reboot the system when the installation is complete. This update ought to resolve the issue.

If you cannot or prefer not to perform the update, you can work around the error by disabling the Automatic Update feature. Open the Start menu, right-click My Computer, and select Properties in the pop-up menu. When the System Properties dialog box appears on-screen, open the Automatic Updates tab. Select the Turn Off Automatic Updates option and click OK. Reboot the PC to complete the process. Keep in mind that you will have to download all updates manually for as long as the Automatic Updates feature remains disabled. You can turn on Automatic Updates again by returning to the Automatic Updates tab and selecting the Automatic option. ▀

Have questions about an error message you've seen? Send us your message (errormessages@smartcomputing.com), and we'll try to decipher it. Tell us what version of Windows you're using, give the full text of the error message, and provide as many details in your explanation as possible. Volume prohibits individual replies.

FAST FIXES

Update for Outlook 2007

Problem: Microsoft has identified an error in Outlook 2007 that allows private calendar items to be opened if located through the Search Desktop function. Microsoft also identified performance slowdowns that could occur in Outlook 2007 when a user works with a large .PST (personal folder) or .OST (offline folder) file.

Resolution: Download and install an 8.3MB update that corrects both the security issue with private calendars and the performance problems when using .PST or .OST files. Go to support.microsoft.com/search and type KB933493 in the For field and click the Search button. Under Results, click Description Of The Update For Outlook 2007: April 13, 2007. Although this document is from April, the update itself is newer. On the Description Of The Update For Outlook 2007: April 13, 2007 page, click the How To Obtain And Install The Update link near the top of the page (under the On This Page heading). Then click the link under the heading How To Obtain And Install The Update. On the resulting download page, click the Continue button in the Validation Recommended box. Follow the on-screen instructions to verify that you have a legitimate copy of Outlook 2007. Once Microsoft's site validates your software, you will see the same download page again. However, this time, there will be a Download button in the box in the center of the screen. Click that button to begin the download. When prompted, choose to save the file to your hard drive. Locate the file (outlook2007-kb933493-fullfile-x86-glb.exe) on your hard drive and double-click it to launch the installer.

support.microsoft.com/search

CyberLink PowerCinema 5 Build 3807

Problem: CyberLink has identified a problem that may prevent a user from

configuring PowerCinema 5 to save recorded TV broadcasts to a drive other than the C: drive. Version 5 may also present problems displaying PowerCinema on a secondary monitor.

Resolution: If you own a retail copy of CyberLink PowerCinema 5, you may download and install the latest build of PowerCinema from CyberLink's Web site. Go to www.cyberlink.com and click the Downloads tab near the top of the screen. Under the DVD Playback heading, locate PowerCinema 5 and click the corresponding blue icon in the Patches column. Under the heading Free Patch Files And Updates For

CyberLink PowerCinema 5.0, find the patch with a creation date of 2007-05-23. (If a newer build is available, you may select it instead.) Click the Click Here link for the patch. On the resulting page, click the red Download button. Follow the instructions on the screen to download the 15.7MB file to your hard drive. Once the download is complete, restart your computer. Then locate and double-click the file you downloaded to launch it. If any further instructions appear on the screen, follow them to complete the installation.

www.cyberlink.com

FIX OF THE MONTH

Cumulative Update for Internet Explorer 7 for Windows XP Service Pack 2

Problem: Microsoft has determined that a number of vulnerabilities exist in IE7 that make it possible for an attacker to run remote code on a user's computer. One of these vulnerabilities provides an avenue for an attacker to use spoofing to perform a malicious attack.

Solution: Download and install this Critical Update. If you have your system set to automatically install Critical Updates, you should already have this update installed. To confirm that the update is already installed, click the Start menu and Control Panel. Double-click Add Or Remove Programs. In the Currently Installed Programs And Updates list, scroll down to Windows Internet Explorer 7 - Software Updates. Under that heading, you will see all installed updates for IE7. If you see an update labeled Security Update For Windows Internet Explorer 7 (KB933566), you already have the

update. If you do not have the update installed, go to support.microsoft.com/search and type KB933566 in the For field and click the Search button. Then click the MS07-033: Cumulative Security Update For Internet Explorer link. On the resulting security bulletin page, click the link directly under IT Professionals. Scroll down to the chart of Affected Software, locate the heading Internet Explorer 7, and click the Windows Internet Explorer 7 link next to Windows XP Service Pack 2. On the resulting download page, click the Download button in the blue Quick Details box in the center of the screen. When prompted, choose to save the 8.1MB file to your hard drive. Locate the file (IE7-WindowsXP-KB933566-x86-ENU.exe) that you just downloaded. Double-click it to launch the installer. After the installation is complete, restart your computer.

support.microsoft.com/search

Q & A

Need help with your hardware or software? Looking for simple explanations on technical subjects? Send us your questions!

Get straight answers to your technical questions from *Smart Computing*. Send your questions, along with a phone and/or fax number, so we can call you if necessary, to: *Smart Computing* Q&A, P.O. Box 85380, Lincoln, NE 68501, or email us at q&a@smartcomputing.com. Please include all version numbers for the software about which you're inquiring, operating system information, and any relevant information about your system. (Volume prohibits individual replies.)



Online

In addition to filling up your inbox, spam is dangerous for another reason: Spam is a common way for viruses to propagate.

Q I've been getting more and more spam in my inbox lately, most of it either trying to sell me something useless or to convince me to invest in some crazy stock. Can you give me any ideas on how to cut this down?

A Spam (sometimes referred to as unsolicited commercial email—UCE) is one of the banes of the Internet, with no easy solution. The reason is that for spammers, sending spam can be very lucrative. In addition to filling up your inbox, spam is dangerous for another reason: Spam is a common way for viruses to propagate. So avoiding spam is good for both your mental health and your computer's well-being.

Reducing the amount of spam you see in your inbox depends on two strategies: The first is avoiding spam altogether, and the second is using some sort of spam filter to move the spam out of sight.

Avoiding spam can be difficult since email is an integral communication tool for many people. In addition, your email address is often used whenever you sign up for access to many Web sites and Internet services. The key to managing the exposure of your email address is to maintain two addresses. The first is your primary address, used for essential communication. The second address is used for any site that requires an email address. This second address is, in effect, a spam trap.

For example, many popular news Web sites now require you to sign up to access their content; otherwise all you see are the headlines. With our strategy, when you sign up for the Web site, you would use your second (spam trap) address. This compartmentalizes the types of email you'll receive into personal email and registration-related email. We recommend using this type of email account for any nonpersonal email communication.

Obtaining a second email account is easy with the numerous free email services available.

Gmail (gmail.google.com) from Google and Yahoo! Mail (mail.yahoo.com) are two easy-to-use email services that provide unlimited storage and are accessible via your browser or traditional email client. In addition to these services, check with your ISP (Internet service provider) to see if it offers additional mailboxes at no charge.

Filtering spam from your inbox is the second phase in our spam-free strategy. Our best recommendation is to switch to Gmail for your email service. Not only is Gmail free, but it includes arguably the best spam-fighting system available. Most spam detection systems use a pattern-matching system to detect and isolate spam. When you run these applications on your home computer, you have to train the spam application so it knows what spam looks like.

The problem with this is that the spammers are very savvy when it comes to masking the spam they send. Their entire business plan depends on circumventing spam filters, and they use very smart programmers to determine how to best deliver spam to your inbox. The end result is a Sisyphean game of blocking new versions of spam as they are designed.

Gmail takes advantage of what's known as a network effect to fight spam. With millions of users, Gmail doesn't rely on just you to help identify spam. As spam arrives at Gmail inboxes and is marked as spam by users, it eventually is automatically categorized as spam and moved into your spam folder.

Our first recommendation depends upon how easy it is for you to switch your email address. If switching your email address is not feasible, it's worth checking to see if your ISP offers any spam-filtering services. Be sure to ask about how to access blocked spam, because even the best spam filters mistakenly block some legitimate email, and you'll want to be able to periodically check to see if any legitimate email suffered this fate.



Hardware

Q The other night, we had a pretty serious thunderstorm, and while reading my email, I heard a loud pop from my computer's speakers. Nothing seems to be wrong with my computer, but I'm concerned about lightning knocking out my computer. Shouldn't my surge protector be enough?

A A surge protector is designed to protect your computer from electrical surges caused by a misbehaving appliance or other small variation in your house's power supply. In addition, most surge protectors are single-use devices. Once they've been subjected to a surge, they don't provide any additional protection. For these reasons, we look at surge protectors as glorified extension cords instead of something that provides true protection for your computer.

It's important to properly evaluate the potential damage electricity can cause to your computer and the likelihood of specific types of damage. The most common electrical problems experienced by your computer are surges, drops, and "dirty" electricity. Surges are a spike in the line voltage and are usually due to a problem in the electricity supplied to your house. Lightning would fall into this category. Dirty electricity is when the voltage of the electricity varies more than it should and is usually caused by a poor quality electrical system in your house. Drops are instances in which the voltage in the outlet supplying your computer drops below 110 volts. Although there are numerous causes for drops, the most common is an appliance that suddenly

requires more current, temporarily causing a drop at other points.

Most UPS (uninterruptible power supply) devices protect your computer from nominal surges and spikes. Some models also "clean" up the current through the use of a rectifier. However, neither UPS devices nor surge protectors will protect your computer from the spike caused by a lightning strike. The amount of energy that is delivered by a lightning bolt would simply overwhelm most consumer-grade devices and many commercial-grade systems, as well.

So how can you protect your computer from a lightning strike? The best strategy if you're in the midst of a severe thunderstorm with lightning is to shut down your computer and physically unplug it from your electrical outlet, your phone line (if you're using a dial-up modem), and any network cables. Although this is inconvenient, it's the most effective method. Of course, in a severe thunderstorm, your own personal safety far outweighs protecting your computer!

It's also important to weigh the likelihood of a lightning strike compared to other electrical problems. Despite the dramatic nature of a lightning strike, it's far more common for a different problem to damage your computer: the power outage. If your power is shut off while your computer is running, you risk damaging your hard drive and all the data stored on it. This is where a reliable UPS proves its worth as it provides power (via a battery) to the computer.



Online

Q I've been using both free Wi-Fi hotspots and fee-based hotspots in my hometown and when I'm on the road traveling. Are there any steps that I can take to improve my security when I'm using these various hotspots?

A Wi-Fi has become a staple for business users in the last few years; it's hard to imagine traveling without being able to read email or surf the Web while waiting for a connecting flight or while staying at a hotel.

Despite their convenience, they do pose a security problem for the unwary.

The first problem is that it's trivial for someone to create a hotspot that looks legitimate but isn't. For example, someone could set up a Wi-Fi hotspot using a laptop computer and name the hotspot "Starbucks." When you join this hotspot, your traffic would be routed through the hacker's laptop, and he could see and control everything you do.

Even when you're using a reputable hotspot, most of your Internet traffic can be

viewed by other users of the hotspot. Included in this traffic are your email login information, any email you retrieve, the Web sites you visit, the instant messages you send, and any files you download. Obviously, this can pose a serious problem if you're working with confidential company data or want your online activities kept private.

The best way to protect your computer when using a potentially unsafe Wi-Fi hotspot is to use a VPN (virtual private network). Using a VPN encrypts all of your traffic when you connect to a Wi-Fi hotspot. Companies like JiWire (www.jiwire.com) and

HotSpotVPN (www.hotspotvpn.com) will protect your online activities for a small monthly or annual fee. HotSpotVPN currently costs \$8.88 per month, and JiWire sells an annual service for \$24.95 per year. JiWire also offers a free 10-day trial.

Using a VPN entails connecting to the Wi-Fi hotspot and then authenticating to your VPN provider. Once connected, all your traffic will be routed to (and through) the VPN server and encrypted from end to end. Although VPN networks do add to the cost of using Wi-Fi when traveling, in our experience, it's a prudent investment.



Q I want to transfer from a WinXP machine to new Vista machine. Can I do it with one monitor, or do I need two?

A Your question is succinct. The answer will depend on several circumstances. First, you'll need to determine if both of the systems will work *without* a monitor attached. Some will; some won't. Since we don't know the make and model of the main system board in either system, it's difficult to say whether or not they will work without a monitor. You'll have to do some testing of your own.

Start the system to which the monitor is currently attached. When it is up and running, start the other computer and wait while the system boots. Detach the monitor from the first system and then move it to the other system. Did Windows start normally on that system? If not, shut the second system down and then restart it—this time with the monitor attached during startup. If the system did start normally without the monitor attached, detach the monitor from the second system and reconnect it to the first computer to see if the system is still running and responding. Now, reconnect the monitor to the second system to determine if it is still working. If both systems are operating normally without the monitor, you're in luck.

If one of the computers simply refuses to work without a monitor, consider borrowing one from a friend or look in the phone book under computer rentals. It shouldn't cost much to rent a monitor for a day.

Next, how did you plan to connect the two computers so that you can move data from one computer to the other? Your choices include networking; use of a special "Easy Transfer Cable;" or, if all you wish to move are data files (and not programs), either a special parallel cable or a serial cable outfitted with a "null modem converter." Also, you can copy the data from the source computer onto a floppy disk, CD, DVD, flash drive, or external hard drive and then you trot it over to the destination computer and copy it from the removable storage medium onto your new hard drive. Your choice of medium is, of course, determined by what drive types you already have and the volume of data to be transferred.

Normally, networking means that both systems have a NIC (network interface card), and you have two Ethernet cables and some kind of hub or switch between them. For the limited type of application you're proposing (a one-time data transfer), you can save yourself some cash by asking your local computer store for an Ethernet crossover cable—one with its internal wires modified to eliminate the need for a hub. This will work for a temporary two-computer network but isn't recommended for a permanent setup. You'll still need a NIC in both systems and to invest some time in learning how Vista and WinXP talk to each other. Hint: Vista simply won't play with others unless you set up your login on both systems to use a password on each one. Save some time and use the same username and password in both computers.

The Easy Transfer Cable is available from a variety of manufacturers through multiple retailers.

The Easy Transfer Cable is available from a variety of manufacturers through multiple retailers. It is a special USB 2.0 cable (you'll need that sort of speed in both systems unless you plan to let the transfer run for a long time). In addition to the cable, you'll also need the Windows Easy Transfer and WETC (Windows Easy Transfer Companion) applications from Microsoft to run on both computers. The Companion is required if you want to move programs as well as data. You can download the WETC at support.microsoft.com/kb/931696/en-us. This page also includes a long list of the applications that have successfully been moved using WETC and detailed information about how to perform the transfer. An additional note about WETC: It will only work between two systems using the "x86" (32-bit) versions of WinXP and Vista. Also, there are third-party alternatives, such as The Tornado, (www.thetornado.com), which we discuss on page 8 of our April 2007 edition.

Last, but not least, both Vista and WinXP include the ability to transfer data from one

system to another, using specially modified parallel or serial cables. The cables and/or converters are widely available at computer and office supply stores—usually for less than \$20. The primary disadvantage is speed—there isn't a lot of it in either case, although using a parallel cable is faster than the serial cable. In this case, you'd be farther ahead to simply pull the hard drive out of the WinXP system and temporarily (or permanently, for that matter) install it in your Vista system. Points to ponder: If you want to move applications, you're going to have to use WETC, which will only work over a network or using the Easy Transfer Cable. WETC will not work between two hard drives on the same computer, nor will it work using parallel or serial transfer methods. If all you want to move are documents, music, graphics, email, favorites, etc.—in other words, the products produced by your applications—then any of the methods above will work, with the hard drive transplant taking the least time to accomplish and providing the fastest transfers with the least hassle.



Hardware

Q I have several old computers and monitors that I don't use anymore. Is it safe to just throw these in the trash?

A You didn't mention whether the old equipment was functional or broken. If it's still in working order, you might consider donating it. Depending on the age of the computer, it might serve well for a church, youth group, or other community organization. There are also several organizations across the United States that refurbish old computers under the aegis of Free Geek (www.freegeek.org), as well as Recycles.Org (www.recycles.org).

Free Geek uses volunteers who take old computers in both working and nonworking condition, repair them, and give them to deserving individuals and organizations that can't afford new computers. Headquartered in Portland, Ore., there are affiliate groups in Arkansas, Illinois, Ohio, Indiana, Michigan, Tennessee, and Vancouver, BC. Recycles.Org attempts to match you with organizations in your community that can use the computer equipment. In

both cases, you should be able to write off the donation on your taxes, so be sure to try these two out before you junk your old gear.

If you're unable to donate your computer gear, find an appropriate disposal site. Monitors have heavy metals that, when released into a landfill, can damage the water supply. Many cities are now accepting defunct computer gear for a small fee, and some even offer a periodic amnesty program that allows you to bring your old gear to a recycling center for free.

In addition to donating or properly disposing of your computer gear through the previously mentioned methods, check with the vendors of your computers to see if they offer disposal. Many vendors are now including this service free, and not just for their own equipment. For example, Dell (www.dell.com) always accepts Dell-branded products for recycling, and if you purchase a new Dell system, they'll accept your old non-Dell equipment for free. Other vendors are offering similar programs as they try to minimize the environmental impact caused by improper equipment disposal.

Frequently Asked Questions

Answers to users' most common questions about Device Drivers

Some manufacturer Web sites recommend updating drivers regularly. However, drivers do not wear out or break like physical hardware, so you typically should not need to update drivers once your hardware devices are installed and working properly.

FAQ **What are device drivers, and when should I update them? How do I know if new driver versions are available?**

Device drivers, or simply drivers, are fairly small programs that let an operating system recognize and operate specific hardware devices. Drivers are the glue that ties software and hardware together. For example, device drivers allow Windows XP to use your new graphics adapter or high-speed wireless network card. Although Windows ships with drivers for many basic devices, you should typically install the manufacturer's drivers that ship with the device itself—particularly if you want to use advanced features of that hardware.

Some manufacturer Web sites recommend updating drivers regularly. However, drivers do not wear out or break like physical hardware, so you typically should not need to update drivers once your hardware devices are installed and working properly. You should consider driver updates when something in the PC changes and you encounter performance or operating problems with a new device, you encounter problems with another device that had been working properly, or issues arise with the PC in general.

The hardware manufacturer is usually the best source for new drivers, so check its Web site and look for new driver downloads. If there is a newer version available, be sure to open and read the documentation or Readme file that describes the changes and fixes in the update. If the new driver addresses problems that you're experiencing, then an upgrade is almost certainly the right course.

FAQ **How should I update my device drivers?**

Driver updates are typically distributed as executable files (usually marked with an .EXE extension). Simply download the new installer and run it; the installer will locate the old driver and then remove it or overwrite it with the new driver. Remember that drivers load up into memory and run from memory, so you'll need

to reboot the PC so that the new driver version loads into memory as your computer starts.

If you wind up downloading the driver file without an automated installer, you can try updating the driver using the Device Manager. In Windows XP, click Start, Control Panel, Performance And Maintenance (in Category View), and then System. Select the Hardware tab and click the Device Manager button. (In Vista, click Start, right-click Computer, select Properties, and then click the Device Manager link in the left pane.) Scroll down and expand the device tree until you locate the device you want to update. Now, right-click the device and select Properties. Select the Driver tab and click Update Driver. This starts the Hardware Update Wizard. Follow the wizard to install the new driver that you downloaded. It's important to note that these processes do not work for every driver or every hardware device, so always refer to the manufacturer's installation instructions for details and caveats.

Another option is to use Microsoft Update (update.microsoft.com), which scans your system and determines what updates are available for your computer.

FAQ **What happens if the new drivers don't work properly? Can I get the original drivers back?**

Windows typically retains a copy of older drivers, so you can use the Roll Back Driver button in your driver Properties dialog box to try recovering the most recently used drivers (see the previous FAQ for instructions on where to find this). However, Windows won't always do this. If you receive a message such as "No Driver Files Have Been Backed Up For This Device" or similar message, then there are no old driver files to recover. In that case, you'll need to either reinstall the original driver from the device's installation media or download an older driver version from the manufacturer's Web site. ■

ACTION EDITOR

Are you having trouble finding a product or getting adequate service from a manufacturer? If so, we want to help solve your problem. Send us a description of the product you're seeking or the problem you're having with customer service. In billing disputes, include relevant information (such as account numbers or screen names for online services) and photocopies of checks. Include your phone number in case we need to contact you.

Letters may be edited for length and clarity; volume prohibits individual replies.



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Roxio's Refund & A Surprisingly Short HDD Warranty

Last year, I purchased Easy Media Creator 8 from Roxio's Web site. Upon installing it, the application stopped working and reported that "Easy Media Creator 8 has encountered an error and needs to close." I spoke with someone at Roxio (Sonic Solutions) who recommended several unsuccessful fixes before telling me to download a utility that would uninstall Easy Media Creator 8. After doing so, my computer became unbootable. I was eventually referred to a Microsoft support article. I attempted the Registry fix, but it didn't help. Sonic Solutions was unable to help me fix my computer, and furthermore, they refused to refund my purchase price for Easy Media Creator 8 because 30 days had passed since my purchase, and the company only honors refund requests placed within that period. Can you help me?

Stephen Wolper
Philadelphia, Pa.

Getting a third-party software company to help you troubleshoot an unbootable PC is usually an uphill battle, even if you suspect that the problem was caused by the third party's software. Fixing these sorts of issues often involves reaching deep into the operating system, a place most software companies are loath to go. To help Stephen reinstall his operating system, we recommended he call *Smart Computing*'s technical support staff (1-800-368-8304). We also forwarded the problem to our Roxio contact to see if we could get Stephen's money back.

Stephen got an email from a representative at Sonic Solutions stating that the company had granted his request for a refund and that they would process it as soon as he supplied the necessary details. In the span of several weeks, Stephen replied to the email three times, supplying the requested information, but never got a response. We followed up with our contact,

but also never got a response. We found out that our contact was no longer with the company. Stephen's refund request was once again authorized and, finally, it appeared on his credit card statement nearly five months after our initial inquiry. At last check, Stephen had purchased a new PC and hadn't had time to contact *Smart Computing* to help him repair his old one. We're here when you need us, Stephen.

Nine months after I purchased a hard drive enclosure and a 300GB Seagate hard drive from TigerDirect, the drive failed. When I tried to return it, TigerDirect told me to call Seagate. When I called Seagate, they told me to call TigerDirect again. Can you help me get a new hard drive?

Linda Sable
Rehoboth, Mass.

We started by calling TigerDirect. A representative told us that because the hard drive failed after the first 30 days, TigerDirect can't replace the item. Assuming the manufacturer's warranty was still in effect, we called Seagate. Our Seagate contact looked up the hard drive's serial number and informed us that the unit is one of a batch of drives that were originally sold to a PC manufacturer. Because this manufacturer planned to support the hardware itself, Seagate sold the hard drives at a reduced rate. TigerDirect then acquired the hard drive and sold it to Linda for a very reasonable sum. Unfortunately, it appears that both Linda and TigerDirect were unaware of the limited warranty attached to the drive.

TigerDirect offered to replace Linda's 300GB hard drive with a 320GB version (TigerDirect no longer offered 300GB hard drives), and after a few weeks of waiting and several more emails, Linda had her replacement drive, albeit an internal one instead of an external one she had requested. Luckily, Linda was able to install the hard drive in the PC herself. ■

Take Out The Trash

I hate buying a brand-new computer, getting it home, hooking everything up, getting all excited, and then finding the Desktop and Programs menu loaded up with all kinds of garbage. It's bad enough that I inevitably fill up my hard drive with forgotten and unused applications. But do computer manufacturers have to hamstring their systems with forgettable and useless software? I've heard from others with similar complaints. Here are a few things, other than cursing at sales and service reps over the phone, you can do to take out the trash on a new computer.

What is trialware, and why is it there?

"Trialware," also unceremoniously called "crapware," can take all sorts of forms. Most of it falls into a few categories: security software (including antivirus and antispyware utilities), music services (often promising free song downloads), online services, and game demos. They're all there for one simple reason—they paid for the privilege. Companies often pay manufacturers to get trial software and "limited time" offers preinstalled on every system. Sometimes the vendors pay up front, sometimes they pay on commission when the trialware generates business. In either case, the computer manufacturer is charging both you *and* the vendors for the privilege of delivering a marketing pitch. We should all have such a racket.

How can you avoid the problem?

If you're anything like me, you'd rather generate less garbage in the first place than have to spend time and effort dealing with it later. At one extreme, you have the option of simply building the machine yourself and installing only the software you want. This is the most reliable method of limiting your machine's software, and it's not as daunting a task as it sounds. Resources like *Smart Computing* make it even easier, and you'll be able to prioritize where your money goes (hint: more to RAM, less to keyboard) when putting the system together.

If that's not practical or feasible, consider purchasing a "white box" system from a local computer store. For a very competitive price, you can select precisely the set of components and programs you want, usually with more support and less marketing. A few big-name computer manufacturers are even starting to notice consumer frustration with trialware. Dell (www.dell.com) is now offering its Vostro desktop and notebook systems (targeted to small business

and home office customers but available to everyone) free of trialware and promotional offers. If a major-brand system bought at retail is the only acceptable option, a Vostro is probably worth considering.

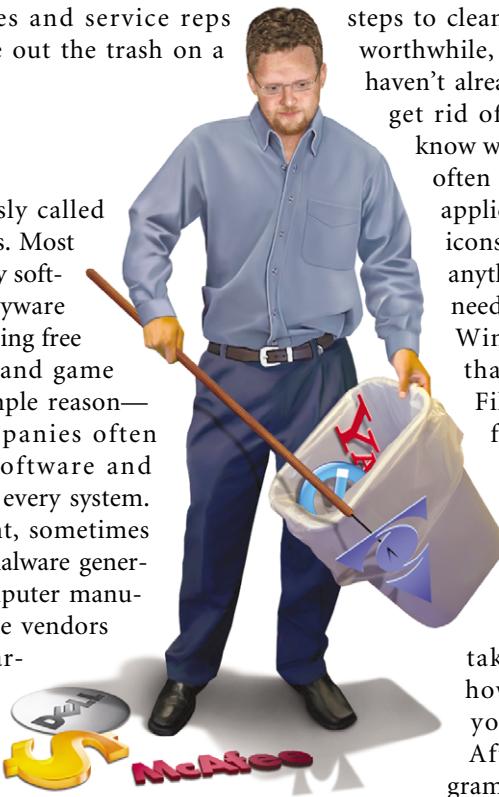
How do you take out trialware?

If you find an unbeatable deal or just value the convenience of off-the-shelf systems, you can take a few steps to clean things up. Though some offers are worthwhile, including free antivirus trials if you haven't already selected a product, you'll want to get rid of most trialware. First, you have to know where to look. Start with the Desktop—often the most intrusive (and least useful) applications will have bright promotional icons right on the Desktop. Start a list of anything that you don't already know you need. Then browse the Programs folder in Windows' Start menu. Keep adding to that list. Finally, browse the Program Files folder on the C: drive (accessed from My Computer or Windows Explorer) and finish the list off.

Start the removal process from the Control Panel's Add Or Remove Programs utility. Remove anything you don't want or don't think you'll use. Not all trialware takes the form of installed software, however. Many "offers" simply sit on your Desktop as Internet shortcuts. After uninstalling unnecessary programs, simply drag any unwanted Desktop items to the Recycle Bin. If you find out later

that you want one of the shortcuts after all, just open the Recycle Bin and restore it. Finally, you can use one of several utilities dedicated to trialware cleanup. The "PC Decrapifier" (free; www.pcdecrapifier.com) is one such example concisely, if crudely, named.

Trialware is one of those maddening support issues that shouldn't exist in the first place. Then again, so are trash bags without built-in handles. Until the day when this garbage ceases to afflict us, it'll take just a little effort on all our parts to grab those handles and heave mightily. ■



BY GREGORY ANDERSON

Gregory Anderson is a regular contributor to *Smart Computing* and several other technology publications. He keeps a sharp eye (with the help of thick glasses) on computing trends and enjoys working with geeks of all stripes—most of the time. Tell Greg about trash removal on your new systems at gregory-anderson@smartcomputing.com.

Of Boats & Barbra

I love boats, and as luck would have it, I recently got to spend two weeks cruising the San Juan Islands in a venerable, creaky wooden boat with my venerable, creaky (but not at all wooden) in-laws.

The boat is a classic 1957 Richardson sedan, 46 feet in length, broad and beamy, with an extended pilothouse and helm above-decks and aft stateroom, forward vee-berths, and light, airy salon below. When the boat creaks, it's the honest sound of wood flexing. It's the way a boat is supposed to sound. (On some boats, what you hear instead is the sound of fiberglass panels slowly delaminating.) When you walk the decks of the *Lady Mick*, you feel teak underfoot, not plastic. This is as it should be.

There's something warmly old-fashioned, almost primal, about sailing in an old, wooden boat. You're afloat in a vessel made of oak and cedar and mahogany, with water lapping against planks that have been hewn and steamed and bent around rows of wooden ribs in a process not unlike that used to build the *Spray*, a 37-foot sloop in which 51-year-old Joshua Slocum single-handedly sailed around the world in 1895-98. The *Lady Mick* was built (in North Tonawanda, N.Y.) using plank-on-frame construction, by a factory that had been established back in 1909. Well cared for, a boat built like that will last 100 years. About how many modern contrivances can you say that?

Such boats are built not by corporations, but by craftsmen, and they have been made in almost this exact fashion for centuries. It's an expensive, time-consuming process, but this is what it means to *build* a boat, rather than to extrude one.

And so, there I was, happily bobbing along, keeping an eye out for "obstacles to navigation" (such as *Little Zero Rock*, which I'd like to point out is located on Haro Strait at 48° 31.669'N 123° 18.648'W and which, for reasons known only to NOAA, lacks any kind of marker or beacon and into which I almost ran the *Lady Mick*, mistaking as I did the eddies of white water ahead for a seal or some birds feeding), when it occurred to me: This boating thing seems like a primitive, traditional undertaking, but it's really not.

Consider that the elderly, much-loved Richardson carried, along with its warm, low-tech patina of teak and mahogany and history, the following devices: GPS, Loran-C, a digital fathometer, two laptop computers, one desktop computer, radar, an AIS (Automatic Identification System) transponder, three VHS radios (two bulkhead-mounted, one handheld), a

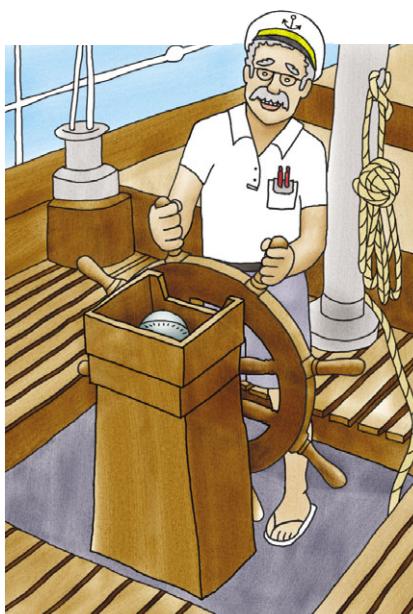
flat-screen TV, two FM walkie-talkies, and charting software with digital charts that apparently covered the entire planet, most of Betelgeuse, and portions of Tolkien's Middle-earth. (The boat also boasts a computerized, automated foghorn, but we can't figure out how to adjust the pitch, which remains curiously high. It's a very effeminate foghorn, come to think of it, sounding oddly like Barbra Streisand screeching her way through the first few bars of "Memory.")

In the end, it begins to feel somewhat counterfeit to rhapsodize about the supposedly low-tech, traditional allure of an old boat such as this. After all, as old as she is, the *Lady Mick* does boast a fairly impressive array of high-tech devices. (Foghorn excepted, of course.) And, given the ease with which an unaided sailor can get lost or beached or worse—and especially since so many idiots in high-priced plastic boats tend simply to *run over* slower vessels—that's a good thing; today's boater needs all the help he can get, technological or otherwise.

Really, living on board was kind of like *pretending* to go low-tech. You know, something like when you go camping and try to explain to people how you were out there "roughing it" in the wilderness with your cot and foam pad, propane stove, frozen steaks,

solar-powered blender, rip-stop nylon tent, MP3 player, Bluetooth-equipped cell phone, and USB-enabled Swiss Army knife. Explorers—and mariners—of old would have just laughed at us. Slocum, who sailed 46,000 miles all alone in a boat he built largely by hand (a boat whose most prominent example of high technology was a tin wind-up clock with a smashed face), would have been insulted by the idea that my two weeks in the *Lady Mick* constituted sailing at all.

Still, it's the closest I can come these days to seeing what life must've been like for Slocum and his fellow boatmen. So if you're out there zooming around in your plastic Bayliner super-yacht, please be careful. Don't hit the *Lady Mick*, because—old and creaky though she might be—we love her. Just save the beer for *after* you dock, keep your eyes open, and listen for Barbra. ■



BY ROD SCHER

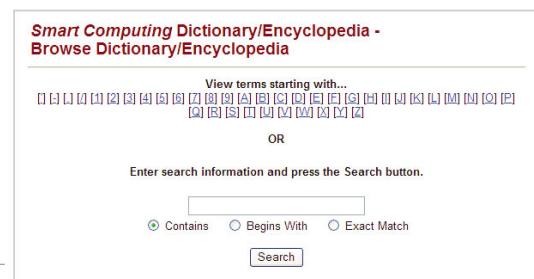
Rod Scher is a former software developer and a recovering English teacher. He's also the publication editor of Smart Computing and will no doubt continue in that position until such time as his boss reads this column. Contact Rod at rod-scher@smartcomputing.com.

May I Have The Definition Please?

Technology can be easy to use and understand, but sometimes the language is difficult to decipher. Because computers and technology have become such a huge part of our everyday lives, the non-computer programmers among us need to be able to speak the same language. So, if you're not quite sure what a zombie or a peripheral is, you can search SmartComputing.com's Dictionary/Encyclopedia and find out! This online dictionary provides plain-English definitions for hundreds of terms, abbreviations, and acronyms. The encyclopedia offers in-depth descriptions of terms and individuals who have impacted the computing world.



1. Log on to SmartComputing.com and click the Computing Dictionary & Encyclopedia link on the blue menu on the left and start expanding your vocabulary today!
2. Browse alphabetically for the term you're looking for or use the Search box to find entries that contain, begin with, or exactly match the term you're searching for.



Error!

If a sudden error message sends chills down your spine, don't run for cover. Instead, scroll down to the Error Messages section of *Smart Computing's* Tech Support Center to read up on "Error Terror," "Coping With PC Anxiety," and other helpful articles.



Happy Halloween

In celebration of all things spooky, we searched for several creepy items on SmartComputing.com. "Halloween" made 89 appearances, "spider" 141, and "ghost" came up a whopping 336 times.

Web Log

Keep up on important (or just plain weird) tech information by checking our Web log. You'll find it on the SmartComputing.com home page.



From Smart Computing's Dictionary

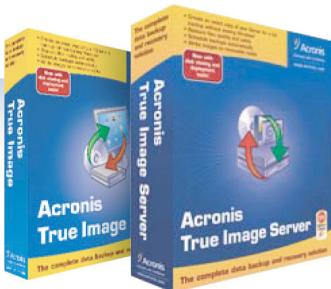
grave site

A site that has been abandoned by its creators and/or the people who update it but is still available for viewing on the Web. In marketing, the word is also used for a site that no longer attracts advertisers because it is not generating enough user interest or online traffic to its pages.





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